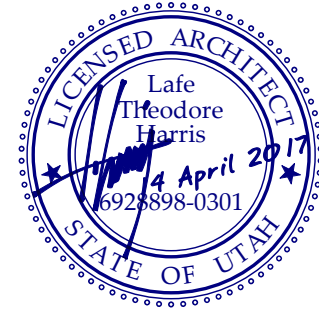




A Restroom Remodel For:  
**Lakeridge 1, 4, 7**  
**Orem UT Lakeridge Stake**

158 East 1100 South  
Orem, Utah



Architect

Lafe Harris [lafe@bhdarchitects.com](mailto:lafe@bhdarchitects.com)  
**BHD Architects**  
65 East Wadsworth Park Drive, Suite 205 Office - 801.571.0010  
Draper, Utah 84020 Mobile - 801.367.0608

Church Project Manager

Milan Malkovich [malkovichmr@ldschurch.org](mailto:malkovichmr@ldschurch.org)  
**American Fork UT PM Office**  
110 East Main Street Office - 801.763.4543  
American Fork, Utah 84003 Mobile - 801.201.0834

Church Facilities Manager

Lynn Adams [AdamsLE@ldschurch.org](mailto:AdamsLE@ldschurch.org)  
**Orem UT Central FM Group**  
140 North 400 West Office - 801.222.3130  
Orem, UT 84059 Mobile - 801.420.3713

Mechanical Engineer

John Alexander [jalexander@vbfa.com](mailto:jalexander@vbfa.com)  
**Van Boerum & Frank Associates**  
330 South 300 East, Suite 200 Office - 801.530.3148  
Salt Lake City, Utah 84111 Mobile - 801.201.2590

Electrical Engineer

David Hinckley [dgh@spectrum-engineers.com](mailto:dgh@spectrum-engineers.com)  
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# **BIDDING REQUIREMENTS**

**FOR PROJECTS (U.S.)**



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# INVITATION TO BID (U.S.)

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## 1. CONTRACTORS INVITED TO BID THE PROJECT:

Broderick & Henderson Construction  
Dynamic Construction  
Majestic Builders  
Oasis Construction  
SRFCO Construction  
Stallings Construction  
Warner Construction

## 2. PROJECT:

Lakeridge 1, 4, 7 Remodel

## 3. LOCATION:

158 East 1100 South  
Orem, UT 84058

## 4. OWNER:

Corporation of the Presiding Bishop of  
The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole  
c/o  
Milan Malkovich  
Project Management Office American Fork  
PO BOX 268  
American Fork, UT 84003

## 5. CONSULTANT:

BHD Architects  
65 East Wadsworth Park Drive, Suite 205  
Draper, UT 84020

## 6. DESCRIPTION OF PROJECT:

- A. Remodel existing restrooms. Add family restrooms. Add sewer line extension on the Church site.
- 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 90 calendar days and will be as noted in the Agreement.

9. **BID OPENING:** Sealed bids will be received and publicly opened at 2:00 PM on Tue, 2 May 2017 at the American Fork Project Management Office located at 110 E Main Street, American Fork, UT 84003.

## 10. BIDDING DOCUMENTS:

A. Bidding Documents may be examined at the following plan room locations:

1) Dodge Data and Analytics  
Office# (859) 885-1091 / Cell# (417) 860-0242  
Fax # (801) 606-7722  
Email: Sherry.roe@construction.com

2) Mountainlands Area Plan Room  
Office (801) 288-1188 Fax (801) 288-1184  
Contact: Mike Luke  
Email: mike@maprutah.com

**11. BIDDER'S QUALIFICATIONS:** Bidding by the Contractors will be by invitation only.

**12. OWNER'S RIGHT TO REJECT BIDS:** Owner reserves the right to reject any or all bids and to waive any irregularity therein.

END OF DOCUMENT

# INSTRUCTIONS TO BIDDERS (U.S.)

---

## 1. DOCUMENTS:

- A. Bidding Documents include Bidding Requirements and proposed Contract Documents. Proposed Contract Documents consist of:
  - 1) Contractor Bid Proposal and Project Agreement (U.S.)
  - 2) Other documents included by reference
  - 3) Addenda.
- B. Bidding Requirements are those documents identified as such in proposed Project Manual.
- C. Addenda are written or graphic documents issued prior to execution of the Contract which modify or interpret the Bidding Documents. They become part of the Contract Documents as noted in the Contractor Bid Proposal and Project Agreement (U.S.) upon execution of the Agreement by Owner.

## 2. BIDDER'S REPRESENTATIONS:

- A. By submitting a bid proposal, bidder represents that
  - 1) Bidder has carefully studied and compared 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 contract work, and has correlated its personal observations with requirements of proposed Contract Documents, and
  - 3) Bid is based on materials, equipment, and systems required by Bidding Documents without exception.

## 3. BIDDING DOCUMENTS:

- A. Copies
  - 1) Owner will provide the Bidding Documents as set forth in the Invitation to Bid.
  - 2) Partial sets of Bidding Documents will not be issued.
- 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) Equal products may be approved upon compliance with Contract Document requirements.
  - 2) Base bid only on materials, equipment, systems, suppliers or performance qualities specified in the Bidding documents.
  - 3) Where a specified product is identified as a "quality standard", products of other manufacturers that meet the performance, properties, and characteristics of the specified "quality standard" may be used without specific approval as a substitute.
- 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) Use Owner's Bid Form titled "Contractor Bid Proposal and Project Agreement (U.S.)".
- 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. Submission of Bids**

- 1) Submit bid in sealed opaque envelope containing only bid form.
- 2) It is bidder's sole responsibility to see that its bid is received at or before the specified time. Bids received after specified bid opening time may be returned to bidders unopened.
- 3) No oral, facsimile transmitted, telegraphic, or telephonic bids, modifications, or cancellations will be considered.

**C. 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 by written request or by reclaiming bid envelope.
- 3) Prior to bid opening, bidder may mark and sign on the sealed envelope that bidder acknowledges any or all Addenda.

**5. CONSIDERATION OF BIDS:**

A. Opening Of Bids - See Invitation to Bid.

**B. Acceptance Of Bid**

- 1) No bidder will consider itself under contract after opening and reading of bids until Owner accepts Contractor's Bid Proposal by executing same.
- 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. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:**

A. Agreement form will be "Contractor Bid Proposal and Project Agreement (U.S.)" provided by Owner.

**7. MISCELLANEOUS:**

A. Pre-Bid Conference. A pre-bid conference may be held at a time and place to be announced.

**B. Examination Schedule for Existing Building and Site**

- 1) Facility Manager: Lynn Adams, 801.370.6890

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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: \_\_\_\_\_

Building Plan Type: \_\_\_\_\_

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

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

Project Number: \_\_\_\_\_

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

\_\_\_\_\_  
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

# CONTRACTOR BID PROPOSAL AND PROJECT AGREEMENT (U.S.)

Corporation of the Presiding Bishop of The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole, ("Owner") and the undersigned Contractor ("Contractor") enter into this *Contractor Bid Proposal and Project Agreement (U.S.)* ("Agreement") and agree as follows:

1. **Property/Project.**

Property/Project Number: 510-1409-17010101  
Property Address ("Project Site"): 158 East 1100 South, Orem, UT 84058  
Project Type: R&I Restroom Renovation ADA, FGC28384  
Project Name ("Project"): Lakeridge 4, 7, 1<sup>st</sup> (SP)  
Stake Name: Orem UT Lakeridge

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

3. **Contract Documents.** Contract Documents consist of:

- a. This Agreement;
- b. Supplementary Conditions for Bid Proposal and Project Agreement (U.S.);
- c. The Specifications (Division 01 and Divisions \_\_\_\_\_);
- d. Drawings entitled and dated Lakeridge 1, 4, 7 Orem UT Lakeridge Stake, 14 Apr 2017;
- e. Addendum No. with date(s) \_\_\_\_\_; and
- f. All written Field Changes, written Construction Change Directives and written Change Orders when prepared and signed by Owner and Contractor.

4. **Compensation.** Owner will pay Contractor for performance of Contractor's obligations under the Contract Documents the sum of \_\_\_\_\_ Dollars (\$\_\_\_\_\_). This is the Contractor's Bid Proposal Amount.

5. **Payment.**

- a. If the Contractor's Bid Proposal Amount is over \$100,000 or if otherwise requested by Owner, Contractor will submit to Owner a schedule of values which allocates the Contractor's Bid Proposal Amount to various portions of the Work. This schedule, when accepted by Owner will be used as a basis for reviewing Contractor's payment requests.
- b. Not more than once each month, Contractor will submit a payment request to Owner. Owner will pay Contractor for work completed within thirty (30) days after Owner receives:
  - 1) Contractor's payment request for work to date;
  - 2) a certification by Contractor that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the current payment request; and
  - 3) releases of all mechanics' liens and claims of subcontractors, laborers, or material suppliers who supplied labor and/or materials for the Work covered by the payment request.
  - 4) updated Construction Schedule.
- c. Owner may modify or reject the payment request if, in Owner's opinion, the Work for which payment is requested is not acceptable or is less complete than represented on the payment request.

6. **Extras and Change Orders.** Owner may order changes in the Work by altering, adding to, or deducting from the Work. In the event of such a change, Contractor's compensation and/or the time of completion will be adjusted to reflect the change. Contractor will not commence work on any change until either: (a) Contractor and Owner have agreed in writing to the amount of the adjustment resulting from the change; or (b) Owner has issued a written order for the change acknowledging that there is a dispute regarding the compensation adjustment relating to the change. If Contractor proceeds with a change in the Work without complying with the preceding sentence, Contractor agrees that it will not be entitled to any additional compensation for such change.



7. **Correction of Work.** Contractor will promptly correct, at its own expense,
  - a. any portion of the Work which
    - 1) fails to conform to the requirements of the Contract Documents, or
    - 2) is rejected by the Owner as defective or because it is damaged or rendered unsuitable during installation or resulting from failure to exercise proper protection.
  - b. any defects due to faulty materials, equipment, or workmanship which appear within a period of one year from the date of Substantial Completion or within such longer period of time as may be prescribed by law or the terms of any applicable special warranty required by the Contract Documents.
  
8. **Time of Completion.** Contractor will complete the Work and have it ready for Owner's inspection within ninety (90) calendar days from Notice to Proceed issued by Owner. Time is of the essence. If Contractor is delayed at any time in the progress of the Work by any act or neglect of Owner, or by changes in the Work, or by strikes, lockouts, unusual delay in transportation, unavoidable casualties, or acts of nature beyond Contractor's control, then the time for completion will be extended by the time that completion of the Work is delayed. However, Contractor expressly waives any damages for any such delays other than those delays willfully caused by Owner.
  
9. **Permits, Surveys, and Taxes.** Contractor will obtain and pay for all permits and licenses, and also pay any applicable taxes. Contractor will also obtain and pay for any surveys it needs to perform the Work. Contractor will conform to all ordinances and covenants governing the Project Site and/or Work.
  
10. **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.
  
11. **Payment of Subcontractors and Materialmen.** Contractor will promptly pay for all labor, materials, and equipment used to perform the Work.
  
12. **Contractor's Insurance.** Prior to performing any work, Contractor will obtain and maintain during the term of this Agreement the following insurance:
  - a. Workers Compensation Insurance.
  - b. 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.
  - c. 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:
    - 1) Limits of the greater of: Contractor's actual coverage amounts or the following:
      - a) \$2,000,000 General Aggregate;
      - b) \$2,000,000 Products - Comp/Ops Aggregate;
      - c) \$1,000,000 Personal and Advertising Liability;
      - d) \$1,000,000 Each Occurrence; and
      - e) \$50,000 Fire Damage to Rented Premises (Each Occurrence)
    - 2) Endorsements attached to the General Liability policy including the following or their equivalent:
      - a) 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.
      - b) ISO Form CG 20 10 (07/04), Additional Insured – Owners, Lessees, Or Contractors (Form B), naming Owner and Architect as additional insureds.
  - d. Automobile Liability Insurance, with:
    - 1) Combined Single Limit each accident in the amount of \$500,000 or Contractor's actual coverage, whichever is greater; and
    - 2) Coverage applying to "Any Auto" or its equivalent.

Contractor will provide evidence of these insurance coverages to Owner by providing an ACORD 25 (2010/05) Form or its equivalent: (1) listing Owner as the Certificate Holder and Additional Insured on the general liability and any excess liability policies, (2) 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 higher), (3) attaching the endorsements set forth above for the Certificate of Liability Insurance, and (4) 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.) Notwithstanding the foregoing, Owner may, in writing and at its sole discretion, modify these insurance requirements.

13. **Independent Contractor Relationship.** The parties expressly agree that Contractor is not an agent or employee of Owner but is an independent contractor solely responsible for all expenses relating to Contractor's business.
14. **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).
15. **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.
16. **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.
17. **Public Statements Regarding Work or Property.** Contractor will not make any statements or provide any information to the media about the Work or Property without the prior written consent of Owner. If Contractor receives any requests for information from media, Contractor will refer such requests to Owner.
18. **No Commercial Use of Transaction or Relationship.**
  - a. 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, or employees shall make any private commercial use of their relationship to Owner or the Work or Property, including, without limitation:
    - 1) By referring to this Agreement, Owner, or the Work or Property 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;
- 2) By using or allowing the use of any photographs of the Work 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
  - 3) 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 Work or Property.

- b. 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.

19. **Indemnity and Hold Harmless.**

- 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 costs and 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.

20. **Resolution of Disputes.** In the event there is any dispute arising under the Contract Documents which cannot be resolved by agreement between the parties, either party may submit the dispute with all documentation upon which it relies to Director of Architecture, Engineering, and Construction, 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 attorneys fees incurred by that party in obtaining the dismissal, including without limitation copy costs, and expert and consultant fees and expenses.

21. **Termination of Agreement 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 this 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 as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.
22. **Termination of Agreement by Owner for Cause.** Should Contractor 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 this Agreement by giving Written Notice to Contractor, take possession of the premises and all materials, tools, and appliances thereon, and finish the Work by whatever method Owner deems expedient. In such case, 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 attorneys fees, expert fees, copy costs, and other expenses), such excess will be paid to Contractor, less any offsets and recoupment. 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 as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.
23. **Termination of Agreement by Owner for Convenience.** Notwithstanding any other provision contained in the Contract Documents, Owner may, without cause and in its absolute discretion, terminate this 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 Owner and/or its 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 and recoupment. 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 as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.
24. **Assignment of Contract.** The parties hereto will not assign any rights or obligations under this Agreement without the prior written consent of the other party.
25. **Integration Clause.** The Contract Documents reflect the full agreement of the parties with respect to the Project and the Work and supersede all prior discussions, agreements, and representations regarding the subject matter of the Contract Documents. The Contract Documents may be amended only in a written document signed by both parties hereto.

26. **Applicable 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.
27. **Enforcement.** In the event either party commences legal action to enforce or rescind any term of the Contract Documents, the prevailing party will be entitled to recover its attorneys 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.
28. **Bid Proposal/Agreement.** Contractor's submission to Owner of this agreement signed by Contractor will constitute Contractor's offer and bid proposal to perform the Work described in this agreement according to the terms thereof. Owner's signing of this agreement and delivery to Contractor of a signed copy will constitute acceptance of Contractor's offer and will convert this document to a binding agreement.
29. **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:

Reviewed By:

License No:  
Date Signed:

# **SUPPLEMENTARY CONDITIONS**

## **FOR CONTRACTOR BID PROPOSAL AND PROJECT AGREEMENT (U.S.)**

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### **ITEM 1 - GENERAL**

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

### **ITEM 2 - LIQUIDATED DAMAGES PAYABLE TO OWNER**

*This section may be included as a separate additional paragraph to the Bid Proposal and Project Agreement, at Owner's discretion:*

**Delay in Completion of the Work.** For each day after the expiration of the designated Time of Completion that Contractor has not completed the Work, Contractor will pay Owner the amount of Two Hundred dollars (\$200.00) per day as liquidated damages for Owner's loss of use 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, attorneys' 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.

### **ITEM 3 - STATE SPECIFIC SUPPLEMENTARY CONDITIONS**

#### **Utah**

#### **UTAH STATE SALES TAX:**

*Add the following to the Bid Proposal and Project Agreement:*

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 Bid Proposal and Project Agreement:*

- 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 Bid Proposal and Project Agreement:*

- 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 STATE PROGRESS PAYMENTS AND FINAL PAYMENT:**

*Replace paragraph 5 of the Bid Proposal and Project Agreement with the following:*

**5. Payment**

- a. If the Contractor's Bid Proposal Amount is over \$100,000.00, Contractor will submit to Owner a schedule of values which allocates the Contractor's Bid Proposal Amount to various portions of the Work. This schedule, when accepted by Owner, will be used as a basis for reviewing Contractor's payment requests.
- b. Progress Payments: Not more than once each month, Contractor will submit a payment request to Owner. Owner will pay Contractor progress payments for work completed within fifteen (15) days after Owner receives:
  - 1. Contractor's progress payment request for work to date;
  - 2. A certification by Contractor that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the current payment request; and
  - 3. Conditional Waiver and Release Upon Progress Payment documents submitted by Contractor (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.
- c. Final Payment: Owner will make full and final payment of the Contract Sum due within thirty (30) days of the completion of all of the following requirements:
  - 1. Contractor has submitted its final payment request;
  - 2. Contractor has submitted a certification that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the final payment request; and
  - 3. Contractor has submitted 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.

Acceptance of final payment by Contractor or any Subcontractor will constitute a waiver of claims by the payee except for those claims previously made to Owner in writing and identified by Contractor in its affidavit as still pending.

If the aggregate of previous payments made by Owner exceeds the amount due Contractor, Contractor will reimburse the difference to Owner.



- d. Owner may modify or reject any payment request if, in Owner's opinion, the Work for which payment is requested is not acceptable or is less complete than represented on the payment request.
- e. 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.
- f. Contractor will maintain a copy of each payment request at the Project site for review by the Subcontractors.
- g. No payment made, either in whole or in part, by Owner will be construed to be an acceptance of defective or improper materials or workmanship.

END OF DOCUMENT

**DIVISION 01****SECTION 01 0000****GENERAL REQUIREMENTS: R&I PROJECT**

- 01 1000 SUMMARY**
- 01 1200 MULTIPLE CONTRACT SUMMARY**
- 01 1400 WORK RESTRICTIONS**
- 01 3000 ADMINISTRATIVE REQUIREMENTS**
- 01 3100 PROJECT MANAGEMENT AND COORDINATION**
- 01 3300 SUBMITTAL PROCEDURES**
- 01 3500 SPECIAL PROCEDURES**
- 01 4000 QUALITY REQUIREMENTS**
- 01 4301 QUALITY ASSURANCE – QUALIFICATIONS**
- 01 4523 TESTING AND INSPECTING SERVICES**
- 01 5000 TEMPORARY FACILITIES AND CONTROLS**
- 01 6100 PRODUCT REQUIREMENTS**
- 01 6200 PRODUCT OPTIONS**
- 01 6400 OWNER-FURNISHED PRODUCTS**
- 01 6600 DELIVERY, STORAGE, AND HANDLING REQUIREMENTS**
- 01 7000 EXECUTION REQUIREMENTS**
- 01 7400 CLEANING AND WASTE MANAGEMENT**
- 01 7700 CLOSEOUT PROCEDURES**
- 01 7800 CLOSEOUT SUBMITTALS**

**SECTION 01 1000 SUMMARY**

- A. Provisions contained in Division 01 apply to all other sections and divisions of Specifications. All instructions contained in Specifications are directed to Contractor. Unless specifically provided otherwise, all obligations set forth in Specifications are obligations of Contractor.
- B. Comply with applicable laws and regulations.
- C. Owner may provide furnishings and/or equipment for Project. Contractor will receive, store, and protect such items on site until the date Owner accepts Project.
- D. Work by Owner: Owner will furnish and install some portions of the Work with its own forces. Complete the Work necessary to accommodate the Work to be performed by Owner before scheduled date for performance of such Work.

**SECTION 01 1200 MULTIPLE CONTRACT SUMMARY**

- A. Separate Contracts may be issued by Owner for performance of certain construction operations at Project site. 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.

**SECTION 01 1400 WORK RESTRICTIONS**

- A. During construction period, Contractor will have use of premises for construction operations. Contractor will ensure that Contractor, its employees, subcontractors, and 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 and/or other uniformed security personnel who have been retained by Owner or Contractor to provide security services.

B. Existing Facilities:

1. If Owner will occupy existing building, reasonably accommodate use of existing facilities by Owner.

### **SECTION 01 3000 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate construction activities to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations that are dependent upon each other for proper installation, connection, and operation. Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

### **SECTION 01 3100 PROJECT MANAGEMENT AND COORDINATION**

A. Multiple Contract Coordination:

1. Contractor shall be responsible for coordination of Temporary Facilities and Controls, Construction Waste Management and Disposal services, and Final Cleaning for entire Project unless directed otherwise by Owner's Representative for those who perform work on Project from Notice to Proceed to date of Substantial Completion.

B. Preconstruction Conference:

1. Attend preconstruction conference and organizational meeting scheduled by Architect or Owner Representative 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, equipment deliveries, general inspection of tests, preparation of record documents and O&M manuals, project cleanup, security, shop drawings, samples, use of premises, work restrictions, and working hours.

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

- A. Coordination preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently before performance of related construction activities to avoid delay.
- B. Allow sufficient review time so installation will not be delayed by time required to process submittals.
- C. Place permanent label or title block on each submittal for identification. Include name of entity that prepared each submittal on label or title block.
- D. Package each submittal appropriately for transmittal and handling.

### **SECTION 01 3500 SPECIAL PROCEDURES**

A. Hot Work Permit (Available from Owner's Representative):

1. 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.

## **SECTION 01 4000 QUALITY REQUIREMENTS**

- 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.
- B. Conflicting Requirements: 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.
- C. Minimum Quantity or Quality Levels: Quantity or quality level shown or specified shall be the minimum provided or performed. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits.
- D. Quality Assurance Services: 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. Owner or Owner's designated representative(s) will perform quality assurance to verify compliance with Contract Documents.
- E. Quality Control Services: Quality Control will be sole responsibility of Contractor. 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. They do not include inspections, tests or related actions performed by Architect or Owner Representative, governing authorities or independent agencies hired by Owner or Architect. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor:
  - 1. Where services are indicated as Contractor's responsibility, engage qualified Testing Agency to perform these quality control services:
    - a. Contractor will not employ same testing entity engaged by Owner, without Owner's written approval.
- F. Notify Owner immediately if asbestos-containing materials or other hazardous materials are encountered while performing the Work.
- G. Submit to Owner permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records establishing compliance with standards and regulations bearing upon performance of the Work.
- H. Repair And Protection:
  - 1. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - 2. Protect construction exposed by or for Quality Assurance and Quality Control activities.
  - 3. Repair and protection are Contractor's responsibility, regardless of assignment of responsibility for Quality Assurance and Quality Control Services.

## **SECTION 01 4301 QUALITY ASSURANCE - QUALIFICATIONS**

- A. Qualifications: Qualifications in this Section establish minimum qualification levels required; individual Specification Sections specify additional requirements:
  - 1. Fabricator / Supplier / Installer Qualifications:
    - a. 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:
      - 1) Where heading '*VMR (Value Managed Relationship) Suppliers / Installers*' is used to identify list of specified suppliers or installers, Owner has established relationships that extend beyond requirements of this Project. No other suppliers / installers will be acceptable. Follow specified procedures to preserve relationships between Owner and specified suppliers / installers and advantages that accrue to Owner from those relationships.

- 2) Where heading 'Acceptable or Approved Suppliers / Installers / Fabricators' is used to identify list of specified suppliers / installers / fabricators, use only one of listed suppliers / installers / fabricators. No others will be acceptable.
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 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 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:
    - 1) 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 will be performed by entities who are recognized experts in those operations:
    - 1) Specialists will satisfy qualification requirements indicated and will be engaged for activities indicated.
    - 2) Requirement for special will 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.
  - b. Testing Laboratory:
    - 1) AASHTO Materials Reference Laboratory (AMRL) Accreditation Program.
    - 2) Cement and Concrete Reference Laboratory (CCRL).
    - 3) Nationally Recognized Testing Laboratory (NRTL): Nationally recognized testing laboratory according to 29 CFR 1910.7.
    - 4) 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.

## **SECTION 01 4523 TESTING AND INSPECTION SERVICES**

- A. Submittals:
  1. Certificates: Testing Agency will submit certified written report of each inspection, test, or similar service.
  2. 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 to Owner's Representative and to each of following if involved on project: Architect, Consulting Engineers (Engineer of Record), General Contractor, Authorities Having Jurisdiction (if required).
  3. Testing Agency:
    - a. Qualifications of Testing Agency management, personnel, inspector and technicians designated to project.
    - b. Provide procedures for non-destructive testing, equipment calibration records, personnel training records, welding inspection, bolting inspection, shear connector stud inspection, and seismic connection inspections.
- B. Quality Assurance:

1. 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.
  2. Owner will employ independent Testing Agencies to perform certain specified testing, as Owner deems necessary.
  3. Certification:
    - a. 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.
    - b. 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.
  4. Written Practice for Quality Assurance:
    - a. 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.
    - b. Written practice will describe testing agency procedures for determining acceptability of structure in accordance with applicable codes, standards, and specifications.
    - c. Written practice will describe Testing Agency inspection procedures, including general inspection, material controls, visual welding inspection, and bolting inspection.
- C. Quality Control:
1. Quality Control will be sole responsibility of Contractor. Contractor will be responsible for testing, 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.
  2. Notify results of all Testing and Inspection performed by Contractor's independent Testing Agencies to Architect and/or Owner's Representative within 24 hours of test or inspection having been performed:
    - a. Testing and Inspection Reports will be distributed as follows:
      - 1) 1 copy to Owner's Representative.
      - 2) 1 copy to Architect.
      - 3) 1 copy to Consulting Engineer(s) (Engineer of Record).
      - 4) 1 copy to Authorities Having Jurisdiction (if required).
  3. Contractor's Responsibility:
    - a. 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.
    - b. Tests and inspections that are not explicitly assigned to Owner are responsibility of Contractor.
    - c. 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:
      - 1) 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.
      - 2) Taking adequate quantities of representative samples of materials that require testing or helping Testing Agency in taking samples.
      - 3) Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
      - 4) Providing Testing Agency with preliminary design mix proposed for use for materials mixes that require control by Testing Agency.
    - d. For any requested inspection, Contractor will complete prior inspections to ensure that items are ready for inspection.
    - e. All Work is subject to testing and inspection and verification of correct operation.
    - f. Comply:
      - 1) 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.
      - 2) Comply with Contract Documents in making such repairs.
    - g. Data:
      - 1) Furnish records, drawings, certificates, and similar data as may be required by testing and inspection personnel to assure compliance with Contract Documents.
    - h. Defective Work (Non-Conforming Work): Non-conforming Work as covered in General Conditions applies, but is not limited to following requirements Protection:

- 1) 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.
  - 2) Where testing personnel take cores or cut-outs to verify compliance, repair prior to acceptance.
  - 3) Contractor will be responsible for any and all costs incurred resulting from inspection that was scheduled prematurely or retesting due to failed tests.
  - 4) Remove and replace any Work found defective or not complying with contract document requirements at no additional cost to Owner.
  - 5) 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.
- i. Protection:
- 1) Protect construction exposed by or for quality assurance and quality control service activities, and protect repaired construction.
- j. Scheduling: Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities:
- 1) Schedule testing and inspections in advance so as not to delay the Work and to eliminate any need to uncover the Work for testing or inspection.
  - 2) Notify Testing Agency and Architect or Owner as noted in Sections in Division 01 thru Division 50 prior to any time required for such services.
  - 3) Incorporate adequate time for performance of all inspections and correction of noted deficiencies.
  - 4) Schedule sequence of activities to accommodate required services with minimum of delay.
  - 5) Schedule sequence of activities to avoid necessity of removing and replacing construction to accommodate testing and inspections.
- k. Test and Inspection Log:
- 1) Provide system of tracking all field reports, describing items noted, and resolution of each item. Prepare record of tests and inspections. Include following requirements:
    - (a) Date test or inspection was conducted.
    - (b) Description of the Work tested or inspected.
    - (c) Date test or inspection results were transmitted to Architect or Owner Representative.
    - (d) Identification of Testing Agency or inspector conducting test or inspection.
  - 2) Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's or Owner's reference during normal working hours.
- D. Tests And Inspections - General:
1. Testing specifically identified to be conducted by Owner, will be performed by an independent entity and will be arranged and paid for by Owner.
  2. Individual Sections in Division 01 through Division 50 indicate if Owner will provide testing and inspection of the Work of that Section.
  3. Owner may engage additional consultants for testing, air balancing, commissioning, or other special services:
    - a. 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.
    - b. Contractor must cooperate with persons and firms engaged in these activities.
  4. 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 50.
  5. Taking Specimens:
    - a. Only testing laboratory shall secure, handle, transport, or store any samples and specimens for testing.
  6. Scheduling Testing Agency:
    - a. Contractor will coordinate the Work and facilitate timeliness of such testing and inspecting services so as not to delay the Work.
    - b. Contractor will notify Testing Agency and Architect or Owner Representative to schedule tests and / or inspections.
- E. Testing Agency Services And Responsibility:
1. Testing Agency, including independent testing laboratories, will be licensed and authorized to operate in jurisdiction in which Project is located:
    - a. Approved Testing Agency Qualifications: Requirements of Section 01 4301 apply.
  2. Testing and Inspection Services:

- a. Testing Agency will not release, revoke, alter, or increase Contract Document requirements or approve or accept any portion of the Work.
  - b. Testing Agency will not give direction or instruction to Contractor.
  - c. 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.
  - d. Testing Agency will not provide additional testing and inspection services beyond scope of the Work without prior approval of Owner's Representative and/or Architect.
3. Testing Agency Duties:
- a. Independent Testing Agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual specification Sections will cooperate with Architect or Owner Representative and Contractor in performance of its duties and will provide qualified personnel to perform required inspections and tests.
  - b. Testing Agency will test or obtain certificates of tests of materials and methods of construction, as described herein or elsewhere in technical specification.
  - c. Testing Agency will provide management, personnel, equipment, and services necessary to perform testing functions as outlined in this section.
  - d. 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.
  - e. 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.
  - f. 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.
  - g. Welding Procedure Review: Testing Agency will provide review and approval or rejection of all welding procedures to be used and verify compliance with all reference standard requirements.
4. Testing and Inspection Reports:
- a. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
  - b. Laboratory Reports: Testing Agency will furnish reports of materials and construction as required, including:
    - 1) Description of method of test.
    - 2) Identification of sample and portion of the Work tested:
      - (a) Description of location in the Work of sample.
      - (b) Time and date when sample was obtained.
      - (c) Weather and climatic conditions at time when sample was obtained.
    - 3) Evaluation of results of tests including recommendations for action.
  - c. Inspection Reports:
    - 1) Testing Agency will furnish "Inspection at Site" reports for each site visit documenting activities, observations, and inspections.
    - 2) 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.
  - d. Reporting Testing and Inspection (Conforming Work):
    - 1) Submit testing and inspection reports as required within twenty four (24) hours of test or inspection having been performed.
  - e. Reporting Testing and Inspection Defective Work (Non-Conforming Work):
    - 1) 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:
      - (a) 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).
      - (b) Submit written inspection report and test results as required within twenty four (24) hours of test or inspection having been performed.
  - f. Final Report:
    - 1) Submit final report of tests and inspections at Substantial Completion, which identify unresolved deficiencies.
- F. Architect's Responsibility:
1. Architect Duties:
    - a. Notify Owner's Representative before each test and/or inspection:
- G. Field Quality Control:



1. Field Tests And Inspections:
  - a. Field Test and Inspection requirements are described in detail in 'Field Quality Control' in Part 3 Execution' of individual Sections in Division 01 thru Division 49.

## **SECTION 01 5000 TEMPORARY FACILITIES AND CONTROLS**

- A. Owner will provide electric power for construction activities within limits available at existing facility.
- B. 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.
- C. Exercise caution to avoid fire damage: Do not build fires on site.
- D. Permanent mechanical system may be operated upon following conditions:
  1. Do not interfere with normal set-back temperature patterns except as approved by Project Manager.
  2. Do not operate system when the Work causing airborne dust is occurring or when dust caused by such Work is present without first installing temporary filtering system.
- E. Existing lighting system may be used by Contractor.
- F. Contractor will use existing water supply for construction purposes to extent of existing facilities.
- G. 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.
- H. Erect adequate barricades, warning signs, and lights necessary to protect persons from injury or harm.
- I. Contractor is responsible for security of materials, tools, and equipment. Do not permit others to use building keys provided by Owner. Safeguard building and contents while the Work is being performed and secure building when the Work is finished for day.
- J. Protect existing trees and plants. Remove and replace vegetation that dies or is damaged beyond repair due to construction activities.
- K. Provide temporary enclosures at exterior building openings for security and protection from weather, theft, and vandalism. Erect and maintain dust-proof partitions and enclosures as required to prevent spread of dust and fumes to occupied portions of building.
- L. 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 noisemaking tools and equipment to hours that will minimize complaints from persons or firms near site.
3. Protect the Work, materials, apparatus, and fixtures from injury due to weather, theft, and vandalism.

## **SECTION 01 6100 PRODUCT REQUIREMENTS**

- A. Provide products that comply with Contract Documents, are undamaged, and, unless otherwise indicated, are 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.

## **SECTION 01 6200 PRODUCT OPTIONS**

- A. 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 Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
    - b. Approved Products / Manufacturers / Suppliers / Installers:
      - 1) Category One:
        - (a) Owner has established 'Value Managed Relationships' that extend beyond requirements of this Project. No substitutions or equal products will be allowed on this Project.
        - (b) 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 National Contracts that contain provisions extending beyond requirements of this Project. No substitutions or equal products will be allowed on this Project.
        - (b) 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) Specified products are provided to Church Projects under a National Account Program. Use these products to preserve advantages that accrue to Owner from those programs. No substitutions or equal products will be allowed on this Project.
      - 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 convenience to Contractor as 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 or Owner Representative by Addendum.
      - 2) Type Two: Use specified products / manufacturers unless approval to use other products and manufacturers has been obtained from Architect or Owner Representative 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 will conform to Contract Document requirements.

## **SECTION 01 6400 OWNER-FURNISHED PRODUCTS**

- A. Install items furnished by Owner or receive and store in safe condition items purchased directly by Owner according to requirements of Contract Documents.

#### **SECTION 01 6600 DELIVERY, STORAGE, AND HANDLING 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.
- 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.
- E. Store products at site in manner that will simplify inspection and measurement of quantity or counting of units.
- F. Store heavy materials away from Project structure so supporting construction will not be endangered.
- G. Store products subject to damage by elements above ground, under cover in weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

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

- A. Design, furnish, and install all shoring, bracing, and sheathing as required for safety and for proper execution of the Work and, unless otherwise required, remove same when the Work is completed.
- B. Require installer of each major component to inspect both substrate and conditions under which the Work is to be done:
  - 1. Notify Owner in writing of unsatisfactory conditions.
  - 2. Do not proceed until unsatisfactory conditions have been corrected.
- C. Provide attachment and connection devices and methods necessary for securing the Work:
  - 1. Secure the Work true to line and level.
  - 2. Allow for expansion and building movement.
- D. Recheck measurements and dimensions before starting each installation.
- E. Where mounting heights are not shown, install individual components at standard mounting heights recognized within industry or local codes for that application. Refer questionable mounting height decisions to Owner for final decision.
- F. Cover and protect furniture, equipment, and fixtures from soiling and damage when demolition the Work is performed in rooms and areas from which such items have not been removed.
- G. Completion Inspection:
  - 1. Upon 100 percent completion of Project, Contractor will request Substantial Completion Inspection.
  - 2. Owner will conduct Substantial Completion Inspection in presence of Contractor and furnish list of items to be corrected.
  - 3. Contractor will notify Owner in writing when items have been corrected.

#### **SECTION 01 7400 CLEANING AND WASTE MANAGEMENT**

- A. Disposal Of Waste:
  - 1. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in landfill or incinerator acceptable to authorities having jurisdiction:

- a. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  - b. Remove and transport debris in manner that will prevent spillage on adjacent surfaces and areas.
  2. Burning: Do not burn waste materials.
  3. Disposal: Transport waste materials off Owner's property and legally dispose of them.
- B. Progress Cleaning:
1. Keep premises broom-clean during progress of the Work.
  2. 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.
  3. Clean and maintain completed construction as frequently as necessary throughout construction period.
  4. Remove waste materials and rubbish caused by employees, subcontractors, and contractors under separate contract with Owner and dispose of legally.
- C. Final Cleaning:
1. Clean each surface or unit to condition expected in normal, commercial-building cleaning and maintenance program. Comply with manufacturer's instructions. Remove all rubbish from under and about building and leave building clean and habitable.
  2. In addition to general cleaning noted above, perform cleaning for all trades at completion of the Work in areas where construction activities have occurred.
  3. If Contractor fails to clean up, Owner may do so and charge cost to Contractor.

## **SECTION 01 7700 CLOSEOUT PROCEDURES**

- A. General:
1. 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.
  2. 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.
  3. Date of Substantial Completion shall not occur until completion of construction work, unless agreed to by Architect / Owner's Representative and included on Certificate of Substantial Completion.
- B. Preliminary Closeout Review:
1. When Architect, Owner and Contractor agree that project is ready for closeout, Pre-Substantial Inspection shall be scheduled. Preparation of floor substrate to receive carpeting and any work which could conceivably damage or stain carpet must be completed, as carpet installation will be scheduled immediately following this inspection.
  2. Prior to this inspection, completed test and evaluation reports for HVAC system and font, where one occurs, are to be provided to Project Manager, Architect, and applicable consultants.
  3. 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:
    - a. Punch list of items requiring completion and correction will be created.
    - b. Time frame for completion of punch list items will be established, and date for Substantial Completion Inspection shall be set.
- C. Substantial Completion Inspection:
1. 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.
  2. 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.
  3. 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:
    - a. Date of Substantial Completion.
    - b. Punch List Work not yet completed, including seasonal and long lead items.
    - c. Amount to be withheld for completion of Punch List Work.
    - d. Time period for completion of Punch List Work.
    - e. 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.

4. 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.
- D. Final Acceptance Meeting:
1. 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.
  2. Owner, Architect and Contractor execute Owner's Project Closeout - Final Acceptance form, and verify:
    - a. 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.
    - b. Owner's maintenance personnel have been instructed on all system operation and maintenance as required by the Contract Documents.
    - c. Final cleaning requirements have been completed.
  3. 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.
  4. When Owner and Architect confirm that The Work is satisfactorily completed, Architect will authorize final payment.

## SECTION 01 7800 CLOSEOUT SUBMITTALS

- A. Operations And Maintenance Data: Operations And Maintenance Manual that include:
1. 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. Show substitutions, selection of options, and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.
      - (2) Note related record drawing information and Product Data.
  2. Soils Report:
    - a. Copy of Soils Report.
  3. Operations and Data:
    - a. Operations and maintenance submittals required by Contract Documents.
  4. Warranty Documentation:
    - a. Copies of warranties required by Contract Documents.
  5. Record Documentation:
    - a. Certifications required by Contract Documents.
    - b. Documentation submittals required by Contract Documents.
    - c. Testing and Inspection Reports required by Contract Documents.
  6. Landscape Management Plan (LMP):
    - a. Irrigation Section:
      - (1) Documentation required by Sections under 32 8000 Heading: Irrigation.
    - b. Landscaping Section:
      - (1) Documentation required by Sections under 32 8000 Heading: Irrigation.
- B. Warranties:
1. 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.
  2. Delivery of guarantees and warranties will not relieve Contractor from obligations assumed under other provisions of Contract Documents.
- C. 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 reference during normal Working hours.
  2. Maintain clean, undamaged set of Drawings. Mark set to show actual installation where installation varies from the Work as originally shown. Give particular attention to concealed elements that would be difficult to measure and record at later date.
    - a. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.

- b. Mark new information that is important to Owner, but was not shown on Contract Drawings.
- c. Note related Change Order numbers where applicable.

**END OF SECTION**

# **DIVISION 02: EXISTING CONDITIONS**

## **02 4000 DEMOLITION AND STRUCTURE MOVING**

### **02 4119 SELECTIVE STRUCTURE DEMOLITION**

END OF TABLE OF CONTENTS

**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.

**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 03: CONCRETE

## 03 3000 CAST-IN-PLACE CONCRETE

03 3053 MISCELLANEOUS EXTERIOR CAST-IN PLACE CONCRETE

END OF TABLE OF CONTENTS

**SECTION 03 3053****MISCELLANEOUS EXTERIOR CAST-IN-PLACE CONCRETE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Compact aggregate base for miscellaneous cast-in-place concrete as described in Contract Documents.
  2. Furnish and install sealants as described in Contract Documents.
- B. Related Requirements:
1. Section 01 0000: 'General Requirements':
    - a. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
    - b. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
    - c. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
    - d. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
    - e. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
    - f. Section 01 7800: 'Closeout Submittals'.
  2. Section 03 3111: 'Normal Weight Structural Concrete' for:
    - a. Concrete mix information and use admixtures.
    - b. Field Quality Control Testing and Inspection requirements for concrete.
    - c. Pre-installation conference held jointly with other concrete related sections.

**1.2 REFERENCES**

- A. Association Publications:
1. American Concrete Institute, Farmington Hills, MI [www.concrete.org](http://www.concrete.org). Abstracts of ACI Periodicals and Publications.
    - a. ACI 224R-01, '*Control of Cracking in Concrete Structures*'.
    - b. ACI 224.1R-07, '*Causes, Evaluation, and Repair of Cracks in Concrete Structures*'.
    - c. ACI 224.2R-92(R2004): '*Cracking of Concrete Members in Direct Tension*'.
    - d. ACI 224.3R-95(R2013), '*Joints in Concrete Construction*'.
    - e. ACI 224.4R-13, '*Guide to Design Detailing to Mitigate Cracking*'.
    - f. ACI 302.1R-04: '*Guide for Concrete Floor and Slab Construction*'.
    - g. ACI 305R-10, '*Guide to Hot Weather Concreting*'.
    - h. ACI 306R-10, '*Guide to Cold Weather Concreting*'.
  2. 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)).
- B. Definitions:
1. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.
- C. Reference Standards:
1. American Concrete Institute:
    - a. ACI 117-10: '*Specifications for Tolerances for Concrete Construction and Materials and Commentary*'.

- b. ACI 117M-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary (Metric)'.
  - c. ACI 301-10, 'Specification for Structural Concrete'.
  - d. ACI 301M-10, 'Specification for Structural Concrete (Metric)'.
  - e. ACI 305.1-14, 'Specification for Hot Weather Concreting'.
  - f. ACI 306.1-90 (Reapproved R2002), 'Standard Specification for Cold Weather Concreting'.
  - g. ACI 318-14, 'Building Code Requirements for Structural Concrete and Commentary'.
  - h. ACI 318M-11, 'Metric Building Code Requirements for Structural Concrete and Commentary'.
2. ASTM International:
    - a. ASTM D1751-04(2013), 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)'.
    - b. ASTM E329-14a: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
  3. International Building Code (IBC):
    - a. Chapter 17, 'Structural Tests and Special Inspections' (2012 or latest edition available).

### 1.3 ADMINISTRATIVE REQUIREMENTS

#### A. Pre-Installation Conferences:

1. Participate in pre-installation conference as specified in Section 03 3111:
  - a. Schedule concrete site element pre-installation conference after installation of sleeves, placing of aggregate base, and installation of forms, but before placing of concrete.
  - b. In addition to agenda items specified in Section 01 3100 and Section 03 3111, review following:
    - 1) Review installation scheduling, coordination, and placement of concrete.
    - 2) Review approved mix design and use of admixtures.
    - 3) Review 'Verification Of Conditions' requirements.
    - 4) Review placement, finishing, and curing of concrete including cold and hot weather requirements.
    - 5) Review smooth rubbed concrete finish procedures and requirements (applied immediately after removing concrete formwork while concrete is "green").
    - 6) Review joint layout plan for control and expansion joints for sidewalks, curbs, and gutters.
    - 7) Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
  - c. Review frequency of testing and inspections.
2. Participate in pre-installation conference as specified in Section 31 0501.
  - a. In addition to agenda items specified in Section 01 3100, and 31 0501, review following:
    - 1) Review proposed miscellaneous exterior concrete schedule.

#### B. Scheduling:

1. Notify Testing Agency and Architect twenty four (24) hours minimum before placing concrete for exterior site work concrete (sidewalks, curbs, gutters, etc.).

### 1.4 SUBMITTALS

#### A. Action Submittals:

1. Joint layout plan for control and expansion joints for sidewalks, curbs, and gutters for written approval before starting work on this Section.

#### 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 Inspecting Reports of concrete for exterior site work.

## 1.5 QUALITY ASSURANCE

- A. Testing and Inspection.
  - 1. Owner will provide Testing and Inspection for concrete for exterior site work:
    - a. Owner will employ testing agencies to perform inspection for exterior site work as specified in Field Quality Control in Part 3 of this specification.
      - 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 and perform contractor testing and inspection.
      - 2) See Section 01 1200: 'Multiple Contract Summary'.
    - b. 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.
      - 1) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.

## 1.6 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Cold Weather Limitations:
    - a. Follow requirements of ACI 306 for cold weather concreting.
  - 2. Hot Weather Limitations:
    - a. Follow requirements of ACI 305 for hot weather concreting.

## PART 2 - PRODUCTS

### 2.1 SYSTEM

- A. Materials:
  - 1. Concrete:
    - a. Meet requirements specified in Section 03 3111 for exterior concrete.

### 2.2 ACCESSORIES

- A. Formwork:
    - 1. Meet requirements specified in Section 03 1113.
  - B. Expansion Joint Material:
    - 1. **1/2 inch (12.7 mm)** thick.
    - 2. Manufactured commercial fiber type:
      - a. Meet requirements of ASTM D1751.
      - b. Type Two Acceptable Products:
        - 1) Conflex by Knight-Celotex, Northfield, IL [www.aknightcompany.com](http://www.aknightcompany.com).
        - 2) Sealtight by W R Meadows Inc, Hampshire, IL [www.wrmeadows.com](http://www.wrmeadows.com).
        - 3) Equal as approved by Architect before installation. See Section 01 6200.
- C. Finishing Material:
  - 1. Finishing Material available in multiple concrete shades to closely match concrete surface.
  - 2. Type Two Acceptable Products:
    - a. Mixture of 1 part cement (using same cement as used in concrete foundations), 1 part sand with 95% passing #50 sieve.
    - b. RapidSet WunderFixx by CTS Cement Manufacturing Corporation, Cypress, CA [www.rapidset.com](http://www.rapidset.com).
    - c. Equal as approved by Architect before installation. See Section 01 6200.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verification Of Conditions:
  - 1. Concrete Forms:
    - a. Verify dimensions and spot elevations for locations of forms for concrete footings, stem walls, building slabs, curbs, gutters, walkways, and drainage systems are correct before concrete is placed.
      - 1) Notify Architect of incorrect dimensions or spot elevations in writing.
      - 2) Do not place concrete until corrections are made and verified.

**3.2 PREPARATION**

- A. Surface Preparation:
  - 1. Aggregate base and subgrade:
    - a. Compact to 95%.

**3.3 INSTALLATION**

- A. General:
  - 1. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree into landscaped areas.
- B. Sidewalks and Landings:
  - 1. Slope with cross slope of 1/8 to 1/4 inch per ft (3 to 6 mm per 300 mm) (one to two percent) in direction of intended drainage.
  - 2. Slope away from building 1/8 to 1/4 inch per ft (3 to 6 mm per 300 mm) (one to two percent) minimum.
  - 3. Do not dust with cement.
  - 4. Concrete walks shall be screeded to bring surface to grades and lines as indicated. Surface shall be floated with wood float with no coarse aggregate showing and then given broom finish before concrete sets.
- C. Mow Strips and Aprons:
  - 1. Form and cast mow strips in place.
  - 2. Set top of mow strip above finish grade as follows:
    - a. Sodded Areas: 2 inches (50 mm) below.
  - 3. Compact topsoil underneath mow strips and aprons to density of undisturbed earth.
- D. Joints:
  - 1. Control Joints:
    - a. Depth of control joints shall be approximately one quarter of concrete slab thickness, but not less than one inch (25 mm).
    - b. Control joints to be hand tooled in sidewalks, curbs and gutters, mow strips, and aprons.
    - c. Spacing On Center (+/-):

Sidewalks	4 feet to 6 feet	12 meters to 18 meters
Mow Strips	3 feet to 5 feet	0.90 meters to 1.50 meters

- 2. Expansion Joints:
  - a. Install so top of expansion joint material is 1/4 inch (6 mm) below finished surface of concrete.
  - b. Provide expansion joints at ends of exterior site concrete elements that are perpendicular to and terminate at curbs, building foundations or other concrete elements (i.e. sidewalks, mow strips, aprons).



- c. Provide expansion joints between sidewalks that are parallel, and adjacent, to the main building.
- d. Provide expansion joints around perimeter of concrete slab on grade at mechanical enclosure, around perimeter of slab on grade at dumpster enclosure and at top and bottom of exterior stairs.
- e. Spacing On Center (+/-):

Sidewalks, Curbs and Gutters	40 feet to 100 feet	12 meters to 30 meters
Mow Strips and Aprons	20 feet to 40 feet	6 meters to 12 meters

- f. Seal expansion joints for following areas:
  - 1) Between entryway slabs and building foundations.
  - 2) Between sidewalks and building foundations.
- g. Expansion joints are not required to be sealed for following areas:
  - 1) Within aprons and where apron abuts sidewalks.
  - 2) Within mow strips and where mow strip abuts building foundation and sidewalks.
  - 3) Within sidewalks.

E. Finish:

1. Flatwork:

- a. Curb, Gutter Sidewalks, Mow Strips, Flat Drainage Structures, Stairs, And Miscellaneous:
  - 1) After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
    - a) Provide fine hair finish where grades are less than 6 percent 1-1/4 inch (32 mm).
    - b) Provide rough hair finish where grades exceed 6 percent 1-1/4 inch (32 mm).
    - c) Broom finish, by drawing broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide fine line texture acceptable to Architect. At curb and gutter, apply broom finish longitudinal to curb and gutter flowline.
    - d) On inclined slab surfaces, provide coarse, non-slip finish by scoring surface with stiff-bristled broom, perpendicular to line of traffic. At curb and gutter, apply broom finish longitudinal to curb and gutter flowline.
    - e) Do not remove forms for twenty four (24) hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.
    - f) Round edges exposed to public view to 1/2 inch (13 mm) radius, including edges formed by expansion joints.
    - g) Remove edger marks.

2. Vertical Surfaces (Exposed To View Vertical Surfaces, Exposed Retaining Walls, Exposed Foundation Walls, Concrete Piers, and etc.):

- a. General:
  - 1) Finishing Material to fill and smooth interior and exterior concrete surface defects such as spalls, gouges, cracks, dents, chips, bug holes, stone pockets, honeycombs, voids and other defective areas.
  - 2) Chamfer lines shall be finished.
- b. Surface Preparation:
  - 1) Formwork shall be stripped from concrete while concrete is still "green".
  - 2) Concrete surface to be finished immediately after formwork has been removed.
    - a) Immediately after removing forms, remove joints, marks, bellies, projections, loose materials and other irregularities, and cut back metal ties from surfaces to be exposed.
    - b) Repair defective areas and voids or stone pockets with Finishing Material and smooth to even surface matching surrounding undamaged area.
- c. Smooth Rubbed Finish:
  - 1) Thoroughly wet with water, apply Finishing Material in thin layer, rub in circular motion to smooth uniform finish.
  - 2) Entire surface shall be protected from rapid drying for not less than three (3) days.
  - 3) Surfaces shall be cleaned of drip marks and discolorations.

- 4) Concrete surface shall be left with clean, neat, uniform finish, free from form markings and shall be uniform in color and texture.

### 3.4 APPLICATION

- A. Interface With Other Work:
  1. Membrane Curing Compound:
    - a. Apply product as specified in Section 03 3923' Membrane Concrete Curing' to curbs, gutters, sidewalks, flat drainage structures, stairs, landings, and pads.
      - 1) Exterior concrete placed after about September 1 and located in areas of freeze thaw where de-icers are used:
        - a) See Section 03 3923' Membrane Concrete Curing' for options available.

### 3.5 FIELD QUALITY CONTROL

- A. Field Tests and Inspections:
  1. General:
    - a. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
    - b. Quality Control is sole responsibility of Contractor as specified in Section 01 4523 'Testing And Inspection Services'.
  2. Concrete:
    - a. Testing Agency shall provide testing and inspection for 'Miscellaneous Cast-In-Place Exterior Concrete' as specified in Section 03 3111 'Normal Weight Structural Concrete' in Part 3 Field Quality Control for exterior site work.
- 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.

### 3.6 PROTECTION

- A. General:
  1. Protect concrete that has not received its initial set from precipitation to avoid excess water in mix and unsatisfactory surface finish.

**END OF SECTION**

**SECTION 03 3111****NORMAL WEIGHT STRUCTURAL CONCRETE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install Project concrete work as described in Contract Documents.
  2. Quality of concrete used on Project but furnished under other Sections.
- B. Products Installed But Not Furnished Under This Section:
1. Inserts, bolts, boxes, templates, and fastening devices for other work, including those for bases only for Mechanical and Electrical.
- C. Related Requirements:
1. Pre-installation conference held jointly with Section 31 3111 as described in Administrative Requirements on Part 1 of this specification section.
  2. Section 01 0000: 'General Requirements':
    - a. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
    - b. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
    - c. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
    - d. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
    - e. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
    - f. Section 01 7800: 'Closeout Submittals'.

**1.2 REFERENCES**

- A. Association Publications:
1. American Concrete Institute, Farmington Hills, MI [www.concrete.org](http://www.concrete.org). Abstracts of ACI Periodicals and Publications.
    - a. ACI 214.3R-88(97), '*Recommended Practice for Evaluation of Strength Test Results of Concrete*'.
    - b. ACI 224R-01, '*Control of Cracking in Concrete Structures*'.
    - c. ACI 224.1R-07, '*Causes, Evaluation, and Repair of Cracks in Concrete Structures*'.
    - d. ACI 224.2R-92(R2004): '*Cracking of Concrete Members in Direct Tension*'.
    - e. ACI 224.3R-95(R2013), '*Joints in Concrete Construction*'.
    - f. ACI 224.4R-13, '*Guide to Design Detailing to Mitigate Cracking*'.
    - g. ACI 302.1R-04: '*Guide for Concrete Floor and Slab Construction*'.
    - h. ACI 302.2R-06, '*Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials*'.
    - i. ACI 304R-00, '*Guide for Measuring, Mixing, Transporting and Placing Concrete*'.
    - j. ACI 304.6R-09, '*Guide for the Measure of Volumetric-Measuring & Continuous-Mixing Concrete Equipment*'.
    - k. ACI 305R-10, '*Guide to Hot Weather Concreting*'.
    - l. ACI 306R-10, '*Guide to Cold Weather Concreting*'.
    - m. ACI 309.1R-08, '*Report on Behavior of Fresh Concrete During Vibration*'.
    - n. ACI 311.4R-05, '*Guide for Concrete Inspection*'.
    - o. ACI 347-04, '*Guide to Formwork for Concrete*'.
    - p. Certifications:

- 1) ACI CP-1(13), 'Technical Workbook for ACI Certification of Concrete Field Testing Technician-Grade 1'.
  - 2) ACI CP-10(10), 'Craftsman Workbook for ACI Certification of Concrete Flatwork Technician/Finisher'.
  - 3) ACI CP-19(13), 'Technical Workbook for ACI Certification of Concrete Strength Testing Technician'.
2. 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)).
- B. Definitions (Following are specifically referenced for testing):
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. Cementitious Materials: Portland cement alone or in combination with one or more of following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
  4. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.
  5. Floor Flatness (FF): Rate of change in elevation of floor over a **12 inches (305 mm)** section.
  6. Floor Levelness (FL): Measures difference in elevation between two points which are **10 feet (3.05 m)** apart.
  7. 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:
    - a. Inspection: Not required by code provisions but may be required by Contract Documents.
    - b. Special Inspection: Required by code provisions and by Contract Documents.
    - c. 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. 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.
  8. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Sub-contractor, or Sub-subcontractor, to perform particular construction operation, including installation, erection, application, and similar operations.
  9. 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.
  10. 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.
  11. Owner's Representative: Owner's Designated Representative (Project Manager or Facilities Manager) who will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.
  12. 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.
  13. 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.
  14. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
  15. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
  16. Service Provider: Agency or firm qualified to perform required tests and inspections.

17. Source Quality Control Testing: Tests and inspections that are performed at source, i.e., plant, mill, factory, or shop.
  18. Special Inspection: See Inspection.
  19. Special Inspector: Certified individual or firm that implements special inspection program for project.
  20. Special Test: See Test.
  21. 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.
  22. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
  23. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
  24. 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. American Association of State and Highway Transportation Officials:
    - a. AASHTO M 153-06(2011), 'Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction'.
    - b. AASHTO M 213-01 (2010), 'Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)'.
    - c. AASHTO T 318-02(2011), 'Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying'.
  2. American Concrete Institute:
    - a. ACI 117-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
    - b. ACI 117M-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary (Metric)'.
    - c. ACI 211.1-91(R2009), 'Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete'.
    - d. ACI 301-10, 'Specification for Structural Concrete for Buildings'.
    - e. ACI 301M-10, 'Specification for Structural Concrete (Metric)'.
    - f. ACI 305.1-06, 'Specification for Hot Weather Concreting'.
    - g. ACI 306.1-90 (Reapproved R2002), 'Standard Specification for Cold Weather Concreting'.
    - h. ACI 308.1-11, 'Standard Specification for Curing Concrete'.
    - i. ACI 308.1M-11, 'Standard Specification for Curing Concrete'.
    - j. ACI 318-14, 'Building Code Requirements for Structural Concrete and Commentary'.
  3. ASTM International:
    - a. ASTM A615/A615M-14, 'Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement'.
    - b. ASTM A706/A706M-14, 'Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement'.
    - c. ASTM C31/C31M-12, 'Standard Practice for Making and Curing Concrete Test Specimens in the Field'.
    - d. ASTM C33/C33M-13, 'Standard Specification for Concrete Aggregates'.
    - e. ASTM C39/C39M-14, 'Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens'.
    - f. ASTM C42/C42M-13, 'Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete'.
    - g. ASTM C94/C94M-14b, 'Standard Specification for Ready-Mixed Concrete'.
    - h. ASTM C138/C138M-14, 'Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete'.
    - i. ASTM C140/C140M-14a, 'Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units'.
    - j. ASTM C143/C143M-12, 'Standard Test Method for Slump of Hydraulic-Cement Concrete'.
    - k. ASTM C150/C150M-12, 'Standard Specification for Portland Cement'.
    - l. ASTM C171-07, 'Standard Specification for Sheet Materials for Curing Concrete'.
    - m. ASTM C172/C172M-14a, 'Standard Practice for Sampling Freshly Mixed Concrete'.

- n. ASTM C173/C173M-14, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method'.
  - o. ASTM C192/C192M-14, 'Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory'.
  - p. ASTM C231/C231M-14, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method'.
  - q. ASTM C260/C260M-10a, 'Standard Specification for Air-Entraining Admixtures for Concrete'.
  - r. ASTM C330/C330M-14, 'Standard Specification for Lightweight Aggregates for Structural Concrete'.
  - s. ASTM C494/C494M-13, 'Standard Specification for Chemical Admixtures for Concrete'.
  - t. ASTM C496/C496M-11, 'Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens'.
  - u. ASTM C567/C567M-14, 'Standard Test Method for Determining Density of Structural Lightweight Concrete'.
  - v. ASTM C595/C595M-13, 'Standard Specification for Blended Hydraulic Cements'.
  - w. ASTM C597-09, 'Standard Test Method for Pulse Velocity Through Concrete'.
  - x. ASTM C618-12a, 'Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete'.
  - y. ASTM C803/C803M-03(2010), 'Standard Test Method for Penetration Resistance of Hardened Concrete'.
  - z. ASTM C805/C805M-13a, 'Standard Test Method for Rebound Number of Hardened Concrete'.
  - aa. ASTM C989/C989M-13, 'Standard Specification for Slag Cement for use in Concrete and Mortars'.
  - bb. ASTM C1077-14, 'Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation'.
  - cc. ASTM C1157/C1157M-11, 'Standard Performance Specification for Hydraulic Cement'.
  - dd. ASTM C1688/C1688M-14a, 'Standard Test Method for Density and Void Content of Freshly Mixed Pervious Concrete'.
  - ee. ASTM D1751-04(2013), 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)'.
  - ff. ASTM D1752-04a(2013), 'Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction'.
  - gg. ASTM D3666-13, 'Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials'.
  - hh. ASTM E329-14a: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
  - ii. ASTM E543-13, 'Standard Specification for Agencies Performing Nondestructive Testing'.
  - jj. ASTM E1155-96(2008), 'Standard Test Method for Determining  $F_F$  Floor Flatness and  $F_L$  Floor Levelness Numbers'.
  - kk. ASTM E1212-12, 'Standard Practice for Quality Management Systems for Nondestructive Testing Agencies'.
  - ll. ASTM F710-11, 'Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring'.
  - mm. ASTM F2170-11, 'Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes'.
4. Corps of Engineers:
    - a. CRD-C 508 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.
  5. International Code Council (IBC):
    - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  1. Participate in pre-installation conference as specified in Section 01 3100 and held jointly with following sections:

- a. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
- b. Section 03 2116: 'Epoxy-Coated Reinforcement Steel Bars'.
- c. Section 03 3053: 'Miscellaneous Exterior Cast-In-Place Concrete'.
2. Schedule pre-installation conference prior to placing of footings, installation of foundation forms and reinforcing steel, and installation of anchors, dowels, inserts, and block outs in foundation walls and slabs:
3. In addition to agenda items specified in Section 01 3100, review following:
  - a. Installation scheduling, coordination, placement of concrete, and placement of items installed in and under floor slab.
  - b. Review requirements for preparation of subgrade.
  - c. Review aggregate base requirements.
  - d. Review formwork requirements.
  - e. Review approved mix design requirements and use of admixtures.
  - f. Review reinforcing steel submittals.
  - g. Review placement, finishing, and curing of concrete including cold and hot weather requirements.
  - h. Review jointing requirements and joint layout.
  - i. Review concrete slab tolerances and corrective measures if tolerances not met.
  - j. Review safety issues.
  - k. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
    - 1) Review frequency of testing and inspections.

B. Scheduling:

1. Notify Testing Agency and Architect twenty four (24) hours minimum before placing concrete.

#### 1.4 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

- a. Show dimensioned locations of anchor bolts for hold-down anchors and columns.
- b. Show reinforcement and all necessary bending diagrams and reinforcing steel list, and construction joint locations.
- c. Provide bar schedules and bending details.
- d. Reinforced concrete walls shall be shown in scale elevation (scale at least one quarter inch to one foot). Details shall be in accordance with ACI rules.
- e. Show all formwork for concrete surfaces which are to remain exposed in the finished work.

B. Informational Submittals:

1. Certificates:

- a. Installers:
  - 1) Certification for National Ready Mixed Concrete Association (NRMCA).
  - 2) Certification for ACI-certified Flatwork Finishers and Technicians.

2. Design Data:

a. Mix Design:

- 1) Furnish proposed mix design to Architect for review prior to commencement of Work.
  - a) Include density (unit weight) and void content determined per ASTM C1688/C1688M for fresh mixed properties and per ASTM C140/C140M for hardened concrete properties.
  - b) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use.

b. Ready-Mix Supplier:

- 1) Require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job-site for use of Owner or his representatives. Tickets shall show following:
  - a) Name of ready-mix batch plant.
  - b) Serial number of ticket.
  - c) Date and truck number.
  - d) Name of Contractor.
  - e) Name and location of Project.

- f) Specific class or designation of concrete conforming to that used in Contract Documents.
  - g) Amount of concrete.
  - h) Amount and type of cement.
  - i) Total water content allowed by mix design.
  - j) Amount of water added at plant.
  - k) Sizes and weights of sand and aggregate.
  - l) Time loaded.
  - m) Type, name, manufacturer, and amount of admixtures used.
  - n) Design Data.
- 2) Provide certificates with supporting testing reports verifying compliance with Contract Document requirements and that materials provided are from single source for following:
- a) Cement.
  - b) Aggregate.
  - c) Fly Ash.
3. Source Quality Control Submittals:
- a. Concrete mix design: Submit mix designs to meet following requirements:
    - 1) Proportions:
      - a) Mix Type D (to be used for exterior concrete subject to freeze thaw conditions and de-icers):
        - (1) 4500 psi (31.03 MPa) minimum at twenty eight (28) days.
        - (2) Water / Cementitious Material: 0.45 maximum by weight.
        - (3) Water / Cementitious Material: 0.40 maximum by weight with slump before addition of additives of between 1 inch (25 mm) and 3 inches (76 mm) (Concrete Paving in areas of freeze thaw).
        - (4) Air entrainment: Six (6) percent plus or minus one (1) percent.
      - b) Air Entrainment: Six (6) percent, plus or minus 1-1/2 percent for exterior concrete and foundation walls exposed to freeze thaw conditions or de-icers.
      - c) Do not add water any time during mixing cycle above amount required to meet specified water / cement ratio. No reduction in amount of cementitious material is allowed.
    - 2) Slump:
      - a) 4 inch (100 mm) slump maximum before addition of high range water reducer.
      - b) 8 inch (200 mm) slump maximum with use of high range water reducer.
      - c) Slump not required for Mix Type F.
    - 3) Admixtures:
      - a) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use. Do not use any admixture without Architect's written approval.
      - b) Mineral: An amount of specified Class F (or Class C where Class F is not available) fly ash not to exceed ten (10) percent of weight of cement may be substituted for cement. If substituted, consider fly ash with cement in determining amount of water necessary to provide specified water / cement ratio.
      - c) Chemical: Specified accelerator or retarder may be used if necessary to meet environmental conditions.
      - d) Chemical: Special additives to promote rapid drying concrete may be used in interior concrete slabs on grade if necessary to meet construction schedules.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Pour Reports:
        - a) Provide report that records following information:
        - b) Date and time of start of pour, Date and time of end of pour, and Date and time of end of finishing procedures.
        - c) Temperature at start of pour, Temperature at end of Pour, and Maximum temperature during performance of finishing procedures.
        - d) Wind speed at start of pour, Wind speed at end of pour, and Maximum wind speed during performance of finishing procedures.



- e) Humidity at start of pour, Humidity at end of pour, and High and low humidity during performance of finishing procedures.
  - f) Cloud cover at start of pour, Cloud cover at end of pour, and High and low cloud cover during performance of finishing procedures.
  - g) Screeding method and equipment used.
  - h) Saw cut method and equipment used.
- 2) Testing and Inspection Reports:
- a) Testing Agency Testing and Inspecting Reports of concrete.

## 1.5 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies, but is not limited to following:
- 1. Installers and Installation Supervisor:
    - a. ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
  - 2. Ready-Mix Supplier:
    - a. Comply with ASTM C94/C94M requirements and be certified according to NRMCA's 'Certification of Ready Mixed Concrete Production Facilities'.
  - 3. Testing Agencies:
    - a. Independent agency qualified according to ASTM C1077 and ASTM E329.
      - 1) Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technicians, Grade I according to ACI CP-1 or equivalent certification program.
      - 2) Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be ACI-certified Concrete Laboratory Testing Technician - Grade II.
- B. Testing and Inspection:
- 1. Owner will provide Testing and Inspection on concrete:
    - a. Owner will employ testing agencies to perform testing and inspection on concrete as specified in Field Quality Control in Part 3 of this specification.
      - 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 and perform contractor testing and inspection.
      - 2) See Section 01 1200: 'Multiple Contract Summary'.
    - b. 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.
      - 1) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
- 1. Expansion Filler Material:
    - a. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage And Handling Requirements:
- 1. Expansion Filler Material:
    - a. Store materials in a clean, dry area in accordance with manufacturer's instructions.
    - b. Protect materials during handling and application to prevent damage.

**PART 2 - PRODUCTS****2.1 SYSTEM****A. Manufacturers:****1. Manufacturer Contact List:**

- a. BASF (Construction Chemicals Division), Cleveland, OH [www.master-builders-solutions.basf.us/en-us](http://www.master-builders-solutions.basf.us/en-us).
- b. Bonsal American, Charlotte, NC [www.bonsal.com](http://www.bonsal.com).
- c. Dayton Superior Specialty Chemicals, Kansas City, KS [www.daytonsuperiorchemical.com](http://www.daytonsuperiorchemical.com).
- d. Euclid Chemical Company, Cleveland, OH [www.euclidchemical.com](http://www.euclidchemical.com).
- e. Fritz-Pak Concrete Admixtures, Dallas, TX [www.fritzpak.com](http://www.fritzpak.com).
- f. Grace Construction Products, Cambridge, MA [www.graceconstruction.com](http://www.graceconstruction.com) and Grace Canada Inc, Ajax, ON (905) 683-8561.
- g. L & M Construction Chemicals, Omaha, NE [www.lmcc.com](http://www.lmcc.com).
- h. Larsen Weldcrete by Larsen Products Corp, Rockville, MD [www.larsenproducts.com](http://www.larsenproducts.com).
- i. Sika Corporation, Lyndhurst, NJ [www.sikaconstruction.com](http://www.sikaconstruction.com) and Sika Canada, Pointe Claire, QC [www.sika.ca](http://www.sika.ca).
- j. Unitex, Kansas City, MO [www.unitex-chemicals.com](http://www.unitex-chemicals.com).
- k. U S Mix Products Co, Denver, CO [www.usspec.com](http://www.usspec.com).
- l. W R Meadows, Hampshire, IL [www.wrmeadows.com](http://www.wrmeadows.com).

**B. Performance:**

1. Design Criteria: Conform to requirements of ASTM C94/C94M unless specified otherwise.
2. Capacities:
  - a. For testing purposes, following concrete strengths are required:
    - 1) At 7 days: 60 percent minimum of 28 day strengths.
    - 2) At 28 days: 100 percent minimum of 28 day strengths.
    - 3) At 28 days:
      - a) Mix Type D: **4500 psi (31 MPa)**.

**C. Materials:****1. Table One:**

Portland Cement / Blended Hydraulic Cement Equivalencies		
ASTM C150/C150M (Low Alkali)	ASTM C595/C595M	ASTM C1157/C1157M
Type II	IP (MS)	MS

2. Hydraulic Cement: Meet requirements of ASTM C150/C150M, Type II
  - a. Meet requirements of ASTM C595/C595M, Type IP.
  - b. Meet requirements of ASTM C1157/C1157M, Type MS.
3. Aggregates:
  - a. General:
    - 1) Submit a letter on quarry's letterhead that certifies all aggregate for concrete complies with the requirements of this section. Material certificates which are submitted shall be signed by both the materials producer and the contractor, certifying that materials comply with or exceed requirements specified herein to the Architect, Civil and Structural Engineering Consultant and the Independent Testing Laboratory for review and approval.
    - 2) Aggregates for all concrete shall come from a quarry that is DOT approved and meets or exceeds durability Class I aggregate. The quarry shall submit a letter to Engineer that certifies that all aggregate complies with DOT requirements for durability. Aggregate not meeting DOT durability requirements shall not be used.
  - b. Coarse:
    - 1) Meet requirements of ASTM C33/C33M or nonconforming aggregate that by test or actual service produces concrete of required strength and conforms to local governing codes.
    - 2) Aggregate shall be uniformly graded by weight as follows:

## a) Table Two: Flat Work, Size No. 67.

Sieve	Percent Passing	Sieve	Percent Passing
One Inch	100	25 mm	100
3/4 Inch	90 - 100	19 mm	90 - 100
3/8 Inch	20 - 55	9 mm	20 - 55
No. 4	0 - 10	4.75 mm	0 - 10
No. 8	0 - 5	2.36 mm	0 - 5

## b) Table Three: All Other, Size No. 57.

Sieve	Percent Passing	Sieve	Percent Passing
1-1/2 Inch	100	38 mm	100
One Inch	95 - 100	25 mm	95 - 100
1/2 Inch	25 - 60	12 mm	25 - 60
No. 4	0 - 10	4.75 mm	0 - 10
No. 8	0 - 5	2.36 mm	0 - 5

## c. Fine:

- 1) Meet requirements of ASTM C33/C33M.
- 2) Aggregate shall be uniformly graded by weight as follows:

## a) Table Four:

Sieve	Percent Passing	Sieve	Percent Passing
3/8 Inch	100	9 mm	100
No. 4	95 - 100	4.75 mm	95 - 100
No. 8	80 - 100	2.36 mm	80 - 100
No. 16	50 - 85	1.18 mm	50 - 85
No. 30	25 - 60	0.60 mm	25 - 60
No. 50	10 - 30	0.30 mm	10 - 30
No. 100	2 - 10	0.15 mm	2 - 10

4. Water: Clear, apparently clean, and potable.

5. Admixtures And Miscellaneous:

## a. Mineral:

- 1) Fly Ash: Meet requirements of ASTM C618, Class F (or Class C where Class F is not available) and with loss on ignition (LOI) of three (3) percent maximum.

## b. Chemical:

- 1) No admixture shall contain calcium chloride nor shall calcium chloride be used as an admixture. All chemical admixtures used shall be from same manufacturer and compatible with each other.
- 2) Air Entraining Admixture:
  - a) Meet requirements of ASTM C260/C260M.
  - b) Type Two Acceptable Products:
    - (1) MasterAir VR 10 (formally MB-VR), Master AE 90 (formally MB-AE) or MasterAir AE 400 (formally EverAir Plus) by BASF.
    - (2) Air Mix 200 Series or AEA-92 Series by Euclid.
    - (3) Air Plus or Super Air Plus by Fritz-Pak.
    - (4) Sika Air by Sika.
    - (5) Daravair or Darex Series AEA by W R Grace.
    - (6) Equal as approved by Architect before use. See Section 01 6200.
- 3) Water Reducing Admixture:
  - a) Meet requirements of ASTM C494/C494M, Type A and containing not more than 0.05 percent chloride ions.
  - b) Type Two Acceptable Products:
    - (1) MasterPozzolith (formerly Pozzolith) Series by BASF.
    - (2) Eucon WR 75 or Eucon 91 by Euclid.
    - (3) FR-2 or FR-3 by Fritz-Pak.
    - (4) Plastocrete 160 by Sika.
    - (5) Daracem, WRDA, or MIRA Series by W R Grace.
    - (6) Equal as approved by Architect before use. See Section 01 6200.
- 4) Water Reducing, Retarding Admixture:

- a) Meet requirements of ASTM C494/C494M, Type D and contain not more than 0.05 percent chloride ions.
- b) Type Two Acceptable Products:
  - (1) MasterPozzolith (formerly Pozzolith) Series by BASF.
  - (2) Eucon Retarder 75 by Euclid.
  - (3) FR-1 or Modified FR-1 by Fritz-Pak.
  - (4) Plastiment by Sika.
  - (5) Daratard Series or Recover by W R Grace.
  - (6) Equal as approved by Architect before use. See Section 01 6200.
- 5) High Range Water Reducing Admixture (Superplasticizer):
  - a) Meet requirements of ASTM C494/C494M, Type F or G and containing not more than 0.05 percent chloride ions.
  - b) Type Two Acceptable Products:
    - (1) MasterRheobuild 1000 (formerly Rheobuild 1000) or MasterGlenium (formerly Glenium) Series by BASF.
    - (2) Eucon 37 or Eucon 537 by Euclid.
    - (3) Supercizer 1 through 7 by Fritz-Pak.
    - (4) Sikament 300 by Sika.
    - (5) Daracem or ADVA Series by W R Grace.
    - (6) Equal as approved by Architect before use. See Section 01 6200.
- 6) Non-Chloride, Non-Corrosive Accelerating Admixture:
  - a) Meet requirements of ASTM C494/C494M, Type C or E and containing not more than 0.05 percent chloride ions.
  - b) Type Two Acceptable Products:
    - (1) MasterSet AC 534 (formerly Pozzolith NC 534) or MasterSet AC 122 (formerly Pozzolith122HE) or MasterSet FP 20 (formerly Pozzutec 20+) by BASF.
    - (2) Accelguard 80 by Euclid.
    - (3) Daraset, Polarset or Lubricon by W R Grace.
    - (4) Equal as approved by Architect before use. See Section 01 6200.
- 7) Corrosion Inhibiting Admixture:
  - a) Liquid admixture to inhibit corrosion of steel reinforcement in concrete by introducing proper amount of anodic inhibitor. Admixture shall contain thirty (30) percent calcium nitrite solution and shall be used where called for in specifications or on drawings.
  - b) Type Two Acceptable Products:
    - (1) Eucon CIA by Euclid.
    - (2) DCI or DCI-S by W R Grace.
    - (3) Equal as approved by Architect before use. See Section 01 6200.
- 8) Alkali-Silica Reactivity Inhibiting Admixture:
  - a) Specially formulated lithium nitrate admixture for prevention of alkali-silica reactivity (ASR) in concrete. Admixture must have test data indicating conformance to ASTM C1293.
  - b) Type Two Acceptable Products:
    - (1) Eucon Integral ARC by Euclid.
    - (2) RASIR by W R Grace.
    - (3) Equal as approved by Architect before use. See Section 01 6200.
- 9) Viscosity Modifying Admixture (VMA):
  - a) Liquid admixture used to optimize viscosity of Self-Consolidating Concrete (SCC). Subject to compliance with requirements, provide following at dosage rates per manufacturer's recommendation.
  - b) Type Two Acceptable Products:
    - (1) Vistrol by Euclid.
    - (2) VMAR3 by W R Grace.
    - (3) Equal as approved by Architect before use. See Section 01 6200.
- 10) Shrinkage Reducing Admixture (SRA):
  - a) Liquid admixture specifically designed to reduce drying shrinkage and potential for cracking.
  - b) Type Two Acceptable Products:
    - (1) Eucon SRA by Euclid.

- (2) Eclipse 4500 (exterior concrete) by W R Grace.
  - (3) Eclipse Floor 200 (interior concrete) by W R Grace.
  - (4) Equal as approved by Architect before use. See Section 01 6200.
- 11) Rapid Drying Admixture in Interior Concrete Slabs on Grade:
- a) Admixture specifically designed to promote rapid drying of concrete.
  - b) Type Two Acceptable Products:
    - (1) Concure Systems Admixture by Consure Systems.
    - (2) Aridus Admixture by US Concrete.
    - (3) Equal as approved by Architect before use. See Section 01 6200.

## 2.2 ACCESSORIES

### A. Bonding Agents:

- 1. Type Two Acceptable Products:
  - a. Acrylic Additive by Bonsal American.
  - b. Day Chem Ad Bond (J-40) by Dayton Superior.
  - c. Flex-Con by Euclid Chemical Co.
  - d. Larsen Weldcrete by Larsen Products Corp.
  - e. Everbond by L & M Construction Chemicals.
  - f. MasterEmaco A 660 (formally Acryl 60) by BASF.
  - g. U S Spec Multicoat by U S Mix Products.
  - h. Intralok by W R Meadows.
  - i. Equal as approved by Architect before use. See Section 01 6200.

### B. Evaporation Retardant:

- 1. Type Two Acceptable Products:
  - a. MasterKure ER 50 (Formerly Confilm) by BASF.
  - b. Sure Film J-74 by Dayton Superior.
  - c. Eucobar By Euclid Chemical Co.
  - d. E-Con by L & M Construction Chemicals.
  - e. Pro Film by Unitex.
  - f. U S Spec Monofilm ER by U S Mix Products.
  - g. Equal as approved by Architect before use. See Section 01 6200.

### C. Expansion Filler Material:

- 1. Expansion Filler Material:
  - a. Design Criteria:
    - 1) Resilient, flexible, non-extruding, expansion-contraction joint filler meeting requirements of ASTM D1751 and AASHTO M-213.
    - 2) **1/2 inch (12.7 mm)** thick.
    - 3) Resilience:
      - a) When compressed to half of original thickness, recover to minimum of 70 percent of original thickness.
  - b. Type Two Acceptable Products:
    - 1) Fiber Expansion Joint by W R Meadows, Hampshire, IL [www.wrmeadows.com](http://www.wrmeadows.com).
    - 2) Equal as approved by Architect before installation. See Section 01 6200.
- 2. Recycled PVC Joint Filler:
  - a. Design Criteria:
    - 1) Expansion joint filler manufactured from 100 percent recycled vinyl material meeting requirements of ASTM D1752 and AASHTO M-153.
    - 2) **1/2 inch (12.7 mm)** thick.
    - 3) Compressive/Recovery:
      - a) Meet requirements for ASTM D1752 recover minimum of 90 percent of original thickness.
    - 4) Light gray color.
  - b. Type One Approved Products:
    - 1) Proflex by Oscoda Plastics Inc, Oscoda, MI [www.oscodaplastics.com](http://www.oscodaplastics.com).
    - 2) Equal as approved by Architect before bidding. See Section 01 6200.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Concrete Mixing:
1. General:
    - a. All concrete shall be machine mixed.
    - b. Water gauge shall be provided to deliver exact predetermined amount of water for each batch.
    - c. Reliable system must be employed to insure that no less than predetermined amount of cement goes into each batch.
    - d. Re-tempering partly set concrete will not be permitted.
  2. Transit Mix:
    - a. Transit mix concrete may be used provided it conforms to Specifications and tests herein described and ASTM C94/C94M.
    - b. Central plant producing concrete and equipment transporting it are suitable for production and transportation of controlled concrete and plant is currently approved by local state DOT.
    - c. Maximum elapsed time between time of introduction of water and placing shall be one (1) hour.
    - d. Minimum time of mixing shall be one (1) minute per cubic yard after all material, including water, has been placed in drum, and drum shall be reversed for an additional two (2) minutes.
    - e. Mixing water shall be added only in presence of Inspecting Engineer or inspector employed by Testing Agency.
    - f. Trucks shall not be overloaded in excess of rated capacity as recommended by manufacturer.
- B. Surface Preparation:
1. Inserts, bolts, boxes, templates, pipes, conduits, and other accessories required by Divisions 22, 23, and 26 shall be installed and inspected before placing concrete.
  2. Install inserts, bolts, boxes, templates, pipes, conduits, and other accessories furnished under other Sections to be installed as part of work of this Section.
    - a. Tie anchor bolts for hold-down anchors and columns securely to reinforcing steel.
- C. Removal:
1. Remove water and debris from space to be placed.

### 3.2 INSTALLATION

- A. Special Techniques:
1. Cold Weather Concreting Procedures:
    - a. General Requirements:
      - 1) Materials and equipment required for heating and protection of concrete shall be approved and available at Project site before beginning cold weather concreting.
        - a) Heating devices used to maintain specified temperatures shall have baffle plate above, of sufficient size, and sand bed below, in order to distribute heat.
        - b) Heating devices shall be so operated that temperature of air immediately below slab forms shall not exceed **100 deg F (37.8 deg C)**. Provide sufficient and suitable thermometers to verify compliance.
      - 2) Forms, reinforcement, metallic embedments, and fillers shall be free from snow, ice, and frost. Surfaces that will be in contact with newly placed concrete, including sub-grade materials, shall be **35 deg F (2 deg C)** minimum at time of concrete placement.
      - 3) Thaw sub-grade **6 inches (150 mm)** deep minimum before beginning concrete placement. If necessary, re-compact thawed material.
      - 4) Use no frozen materials or materials containing ice.
      - 5) No salt or other chemical may be used for such protection.

- 6) Only specified non-corrosive non-chloride accelerator shall be used. Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.
  - b. Requirements When Average twenty four (24) Hour Temperature, midnight to midnight, Is Below 40 deg F (4 deg C):
    - 1) Temperature of concrete as placed and maintained shall be 55 deg F (13 deg C) minimum and 75 deg F (27 deg C) maximum.
    - 2) Heat concrete for seventy two (72) hours minimum after placing if regular cement is used; for 48 hours if high early strength cement is used; or longer if determined necessary by Architect.
      - a) During this period, maintain concrete surface temperature between 55 and 75 deg F (13 and 27 deg C).
    - 3) Vent flue gases from combustion heating units to outside of enclosure to prevent carbonation of concrete surface.
    - 4) Prevent concrete from drying during heating period. Maintain housing, insulation, covering, and other protection twenty four (24) hours after heat is discontinued.
    - 5) After heating period, if temperature falls below 32 deg F (0 deg C), protect concrete from freezing until strength of 2000 psi (13.79 MPa) minimum is achieved.
      - a) Protect flatwork exposed to melting snow or rain during day and freezing during night from freezing until strength of 3500 psi (24.13 MPa) minimum is achieved.
  - c. Requirements When Average twenty four (24) Hour Temperature, midnight to midnight, Is Above 40 deg F (4 deg C), but when temperature falls below 32 deg F (0 deg C):
    - 1) Protect concrete from freezing for seventy two (72) hours after placing, or until strength of 2000 psi (13.79 MPa) is achieved, whichever is longer.
    - 2) Protect flatwork exposed to melting snow or rain during day and freezing during night from freezing until strength of 3500 psi (24.13 MPa) minimum is achieved.
  - d. Protect soil supporting concrete footings from freezing under any circumstances.
  - 2. Hot Weather Concreting Procedures:
    - a. Maximum concrete temperature allowed is 90 deg F (32 deg C) in hot weather.
    - b. Cool aggregate and subgrades by sprinkling.
    - c. Avoid cement over 140 deg F (60 deg C).
    - d. Use cold mixing water or ice.
    - e. Use fog spray or evaporation retardant to lessen rapid evaporation from concrete surface.
- B. Tolerances:
- 1. Tolerances shall conform to requirements of ACI 117 or CSA A23.1, except where specified differently:
    - a. Floor test surfaces shall be measured and reported within seventy two (72) hours after completion of slab concrete finishing operations and before removal of any supporting shores to eliminate any curling effect F-numbers.
- C. Placing:
- 1. General:
    - a. Structural
  - 2. General:
    - a. Place as soon after mixing as possible.
    - b. Deposit as nearly as possible in final position.
    - c. No concrete shall be deposited in water.
    - d. Placing of concrete shall be continuous until panel or section is complete.
    - e. In order to avoid overloading of forms and ties, observe following rate of filling for various air temperatures:
      - 1) Table Six: Placing Rate.

Temperature	Rate of Fill per Hour	Temperature	Rate of Fill per Hour
40 deg F	2 feet	4 deg C	600 mm
50 deg F	3 feet	10 deg C	900 mm
60 deg F	4 feet	16 deg C	1 200 mm
70 deg F	5 feet	21 deg C	1 500 mm

- f. Compact concrete in forms by vibrating and other means where required.
    - 1) Thoroughly consolidate concrete around reinforcing bars (Consolidation not required in concrete around reinforcing bars with Mix Type F).
    - 2) Use and type of vibrators shall conform to ACI 309.
  - g. Consolidate concrete thoroughly.
  - h. Do not embed aluminum in concrete.
  - i. Do not use contaminated, deteriorated, or re-tempered concrete.
  - j. Avoid accumulation of hardened concrete.
3. Footings:
- a. Bear **12 inches (300 mm)** minimum into undisturbed earth or on mechanically compacted engineered fill. Step footings at ratio of 1-1/2 horizontal to One vertical unless detailed otherwise. Exterior wall footing shall bear 36 inches minimum below finish grades.
  - b. Level top of finish footing and leave rough.
  - c. Where joints are required, bulkhead, key horizontally, and dowel with two No. 5 reinforcing bars, **48 inches (1 200 mm)** long.
4. Foundations And Walls: Leave steel projecting where required for floor tie.
5. Exterior Slabs:
- a. Dusting with cement not permitted.
  - b. For continuous placing and where shown on Drawings, saw cut one inch deep control joints before shrinkage occurs (**2 inches at 6 inch slabs**) (**50 mm at 150 mm slabs**).
6. Equipment Bases: Coordinate with appropriate Sections for locations and dimensions.
7. Joints:
- a. Construction Joints: Locate where shown on Drawings to least impair strength of completed structure. Construction joints in foundation walls shall not occur within **6 feet (1.80 meters)** of corner and be keyed.
8. Bonding Fresh And Hardened Concrete:
- a. Re-tighten forms.
  - b. Roughen surfaces.
  - c. Clean off foreign matter and laitance.
  - d. Wet but do not saturate.
  - e. Slush with neat cement grout or apply bonding agent.
  - f. Proceed with placing new concrete.
9. Anchor Bolts:
- a. Place anchor bolts not tied to reinforcing steel immediately following leveling of concrete. Reconsolidate concrete around bolt immediately after placing bolt.
  - b. Do not disturb bolts during finishing process.
- D. Curing:
1. Exterior flatwork:
    - a. Membrane cure as specified in Section 03 3923' Membrane Concrete Curing'.

### 3.3 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
1. General:
    - a. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
    - b. Quality Control is sole responsibility of Contractor as specified in Section 01 4523 'Testing And Inspection Services'.
  2. Concrete:
    - a. Testing Agency shall provide testing and inspection for concrete as per ASTM C1077.
    - b. Testing Agency will sample and test for quality control during placement of concrete as directed by Architect.
    - c. Testing and inspections, if performed, will include following:
      - 1) Periodic inspection verifying use of required design mix.
      - 2) Inspection at time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine temperature of concrete.
      - 3) Inspection of concrete and shotcrete placement for proper application techniques.
      - 4) Periodic inspection for maintenance of specified curing temperature and techniques.



- 5) Periodic inspect of formwork for shape, location and dimensions of concrete member being formed:
  - a) Certified Inspector shall inspect forms for general location, configuration, camber, shoring, sealing of form joints, correct forming material, concrete accessories, and form tie locations.
- 6) Concrete moisture and alkalinity testing. See Section 09 0503 Flooring Substrate Preparation.
- d. Testing Agency will sample and test during placement of concrete as directed by Architect and may include following:
  - 1) Sampling Fresh Concrete: ASTM C172/C172M, except modified for slump to comply with ASTM C94/C94M:
    - a) Slump: ASTM C143/C143M, test each time set of compressive specimens are made.
    - b) Air Content: ASTM C173/C173M, volumetric method for lightweight or normal weight concrete: ASTM C231/C231M, pressure method for normal weight concrete each time set of compression test specimens are made.
    - c) Concrete Temperature: Test each time set of compressive specimens are made.
    - d) Unit Weight: ASTM C567/C567M, Test each time set of compressive specimens are made.
  - e. Compression Test Specimen: ASTM C31/C31M; one (1) set of four (4) standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
  - f. Compressive Strength Tests: ASTM C39/C39M: Provide one random sets for site cast concrete.
    - 1) One (1) specimen tested at seven (7) days, two (2) specimens tested at twenty eight (28) days, and one (1) specimen retained in reserve for later testing if required.
    - 2) If strength of field-cured cylinders is less than eighty five (85) percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing in-place concrete.
    - 3) Strength level of concrete will be considered satisfactory if averages of sets of three (3) consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi (3.45 MPa).

### 3.4 PROTECTION

- A. Protect concrete that has not received its initial set from precipitation to avoid excess water in mix and unsatisfactory surface finish.
- B. Do not allow materials resulting from construction activities, which will affect concrete or application of finish floor systems adversely, to come in contact with interior concrete slabs.
- C. Protect interior concrete floors from stains, paint, mortar and other construction activities.

**END OF SECTION**

# DIVISION 05: METALS

05 5871 METAL BRACKETS

END OF TABLE OF CONTENTS

**SECTION 05 5871**

**METAL BRACKETS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Products Supplied But Not Installed Under This Section:
  - 1. Metal brackets necessary to support Vanities in Rest Rooms.
- B. Related Requirements:
  - 1. Section 06 2001: 'Common Finish Carpentry Requirements' for installation of metal brackets.
  - 2. Section 09 9124: 'Interior Painted Metal' for finish painting.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.

**PART 2 - PRODUCTS**

**2.1 FABRICATED UNITS**

- A. Materials:
  - 1. Steel: Meet requirements of ASTM A36/A36M.
- B. Fabrication:
  - 1. Fabricate as detailed.
  - 2. Grind exposed welds smooth and polish to match non-welded metal finish.
  - 3. After fabrication and drilling of mounting holes, shop prime.

**PART 3 - EXECUTION: Not Used**

**END OF SECTION**

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

## **06 1000 ROUGH CARPENTRY**

06 1011 WOOD FASTENINGS  
06 1100 WOOD FRAMING

## **06 2000 FINISH CARPENTRY**

06 2001 COMMON FINISH CARPENTRY REQUIREMENTS  
06 2024 DOOR, FRAME, AND FINISH HARDWARE INSTALLATION

## **06 4000 ARCHITECTURAL WOODWORK**

06 4005 PLASTIC LAMINATE

END OF TABLE OF CONTENTS

**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. Furnishing and installing of other fasteners are specified in individual Sections where installed.

**1.2 REFERENCES**

- A. Reference Standards;
  - 1. APA-The Engineered Wood Association:
    - a. APA AFG-01: Adhesives for Field-Gluing Plywood to Wood Framing (September 1974).
  - 2. ASTM International:
    - a. ASTM A153/A153M-09, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
    - b. ASTM D3498-03(2011), 'Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems'.
    - c. ASTM F1667-11a, '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.
  - 2. Shop Drawings:
    - a. Submit diameter and lengths of fasteners proposed for use on Project. If length or diameter of proposed fasteners differ from specified fasteners, also include technical and engineering data for proposed fasteners including, but not limited to:
      - 1) Adjusted fastener spacing where using proposed fasteners and,
      - 2) Adjusted number of fasteners necessary to provide connection capacity equivalent to specified fasteners.
    - b. Submit on powder-actuated fasteners other than those specified in Contract Documents showing design criteria equivalents at each application.
    - c. Show type, quantity, and installation location of framing anchors. Where necessary, reference Drawing details, etc, for installation locations.

**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. Roof related blocking, wood nailers, and curbs.
  - 2. Wood panel product sheathing.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. National Institute of Standards and Technology (NIST), Technology Administration, U. S. Department of Commerce:
    - a. Voluntary Product Standard DOC PS 20-05, 'American Softwood Lumber Standard'.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conference:
  - 1. Participate in 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) Scope of Work.

**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. Lumber shall be S4S.
    - e. 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. Lumber Ledgers:
  - 1. Design Criteria:
    - a. No. 2 Douglas Fir-Larch, or Southern Pine.
- C. See 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.

## PART 3 - EXECUTION

### 3.1 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 and Contract Drawings.

**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.
  - 2. Furnish and install following items as described in Contract Documents:
- B. Products Installed But Not Furnished Under This Section:
  - 1. Plastic Laminate Countertops.
  - 2. Selected Building Specialties.
  - 3. Miscellaneous as specified elsewhere.
- C. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for furring and blocking.
  - 2. Section 06 4005: 'Plastic Laminate' for countertops.
  - 3. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants, submittal and installation requirements.
  - 4. 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.

**PART 2 - PRODUCTS - Not Used****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. 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**

**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.
- 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. Grouting of frames installed in masonry walls.
  - 2. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants.
  - 3. Sections under 08 1000 heading: Furnishing of doors and metal frames.
  - 4. Sections under 08 7000 heading: Furnishing of finish hardware.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. Door and Hardware Institute (DHI) 14150 Newbrook Drive, Suite 200 Chantilly, VA [www.dhi.org](http://www.dhi.org), *Installation Guide for Doors & Hardware* by Door & Hardware Institute.

**1.3 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.

**1.4 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).

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
1. Fire door installations shall meet code requirements.

## 1.6 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.
- 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. Weld frames and grind smooth all welds.

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. 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.

**END OF SECTION**

**SECTION 06 4005****PLASTIC LAMINATE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
  - 1. Wall-hung counters.
- B. Related Requirements:
  - 1. Section 06 2001: 'Common Finish Carpentry Requirements':
    - a. Installation of wall-hung counters.
  - 2. Sections Under 22 4200 Heading: Plumbing Fixtures.

**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. 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 or UL 723 or ULC 102.
  - 3. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade.
    - a. Premium Grade: Highest Grade available in both material and workmanship where highest level of quality, materials, workmanship, and installation is required.
  - 4. High-Pressure Decorative Laminate (HPDL): Laminated thermosetting decorative sheets intended for decorative purposes. Sheets consist essentially of layers of fibrous sheet material, such as paper, impregnated with thermosetting condensation resin and consolidation under heat and pressure. Top layers have decorative color or printed design. Exposed surface has attractive exposed surface that is durable and resistant to damage from abrasion and mild alkalis, acids, and solvents.
  - 5. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723 or ULC 102.
- C. Reference Standards:
  - 1. ASTM International:
    - a. ASTM E84-15a, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
    - b. ASTM E162-15a, 'Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source'.
  - 2. Kitchen Cabinet Manufacturers Association:
    - a. ASTM/KCMA A161.1-2012, 'Performance And Construction Standards For Kitchen And Vanity Cabinets'.
  - 3. National Electrical Manufacturer's Association / American National Standards Institute:
    - a. ANSI/NEMA LD-3-2005, 'High Pressure Decorative Laminates'.
  - 4. Underwriters Laboratories, Inc.:
    - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (10th Edition).

### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Color selections.
    - b. Manufacturer's technical data sheet.
- B. Informational Submittals:
  - 1. Certificates:
    - a. Provide Manufacturer's certification of compliance to ANSI/NEMA LD 3.
  - 2. Test And Evaluation Reports:
    - a. Test reports: Certified test reports showing compliance with specified performance characteristics and physical properties for Quality Assurance if requested by Owner or Architect.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature for plastic laminate.
        - b) Color selections.

### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire-Test-Response Characteristics: Provide plastic laminate with surface burning characteristics as determined by testing identical products by qualified testing agency.
    - a. Surface-Burning Characteristics:
      - 1) Plastic Laminate 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.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Fabricators:
  - 1. Approved Fabricators. See Section 06 4001 for Approved Fabricators.
- B. Manufacturers:
  - 1. Type Two Acceptable Manufacturers:
    - a. Formica, Cincinnati, OH [www.formica.com](http://www.formica.com) or Formica Canada Inc, St Jean sur Richelieu, PQ (450) 347-7541, all matte finish.
    - b. Nevamar, Odenton, MD [www.nevamar.com](http://www.nevamar.com).
    - c. Pionite Decorative Surfaces, Auburn, ME [www.pionite.com](http://www.pionite.com).
    - d. WilsonArt, Temple, TX [www.wilsonart.com](http://www.wilsonart.com) or WilsonArt International Inc, Mississauga, ON (905) 565-1255.
    - e. Equal as approved by Architect before bidding. See Section 01 6200.
- C. Plastic Laminates:
  - 1. Design Criteria:
    - a. Countertops:
      - 1) Post-formed front edge and backsplash, except where detailed otherwise, with plastic laminate meeting requirements of ANSI/NEMA LD 3: PF 42.
        - a) Vertical Applications: GP 28.



- b) Horizontal (other than countertops): GP 38.
- 2) No raised lip on front edge.
- b. Balancing Material: BK 20.
- c. AWS Quality Grade: Premium.
- 2. Assemblies:
  - a. Countertops shall meet requirements of KCMA A161.1.
  - b. Adhesives for other than post-formed types shall be spray grade, high heat resistant, neoprene contact adhesive.
- 3. Color as selected by Architect from any of the acceptable manufacturers.

**PART 3 - EXECUTION: Not Used**

**END OF SECTION**

# DIVISION 07: THERMAL AND MOISTURE PROTECTION

## 07 9000 JOINT PROTECTION

07 9213 ELASTOMERIC JOINT SEALANTS

END OF TABLE OF CONTENTS

**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. Association Publications:
  - 1. American Architectural Manufacturers Association (AAMA):
    - a. 'Voluntary Specifications and Test Methods for Sealants'.
  - 2. ASM International:
    - a. 'Adhesives and Sealants', Volume 3, ASM International Handbook Committee, (May 1999).
    - b. Committee C24 on Building Seals and Sealants for various Specifications, Guides, Test Methods, and Practices related to sealant specifying and application.
    - c. Committee E6 on Building Performance for various Specifications, Guides, Test Methods, and Practices related to sealant use with air barriers, vapor retarders, and exterior enclosure systems and materials.
  - 3. The Adhesive and Sealing Council, Inc. (ASC) / Sealant, Waterproofing & Restoration Institute (SWR Institute):
    - a. 'Sealants: The Professional's Guide'.
    - b. 'Joint Sealants, Whole Building Design Guide'.
- B. Definitions:
  - 1. Adhere: To cause two surfaces to be held together by adhesion.
  - 2. Adhesive: An adhesive, as defined by The American Society for Testing and Materials (ASTM), is 'a substance capable of holding materials together by surface attachment'.
  - 3. Caulk: Caulks have variety of definitions but are generally recognized as materials used in applications where only minor elastomeric properties are needed.
  - 4. Elastomer: Rubbery material which returns to approximately its original dimensions in short time after relatively large amount of deformation.
  - 5. Flow: Movement of adhesive during bonding process before adhesive is set.
  - 6. Joint: Location at which two substrates are held together with layer of adhesive.
  - 7. Primer: Coating applied to surface, prior to application of an adhesive, to improve performance of the bond.
  - 8. Sealant. Sealants are generally used in applications where elastic properties are needed while adhesives are generally used in applications where bonding strength and rigidity are needed. With technology advancements both sealants and adhesives can be used interchangeably depending on applications performance requirements.
  - 9. 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.
- b. Federal Specifications:
  - 1) Type:
    - a) Type I: Self-leveling, pour grade.
      - (1) Compound which has sufficient flow to give smooth level surface when applied in horizontal joint at 40 deg F (4.4 deg C).
    - b) Type II: Non-sag, gun grade
      - (1) Compound which permits application in joints on vertical surfaces without sagging (slumping) at temperatures 40 deg F (4.4 deg C) and 122 deg. F (50 deg. C).
    - c) Type NS: Non-sag, gun grade.
      - (1) Non-sag shall be a compound which permits application in joints on vertical surfaces without sagging (slumping) at temperatures between -20 deg F and 122 deg. F (- 29 and 50 deg. C).
  - 2) Class:
    - a) Class A: Compounds resistant to 50 percent total joint movement (includes Type I and Type II).
      - (1) Capable of resisting compression-extension cycling of plus and minus 25 percent of nominal half inch width.
    - b) Class B: Compounds resistant to 25 percent total joint movement (includes Type I and Type II).
      - (1) Capable of resisting compression-extension cycling of plus and minus 12 1/2 percent of nominal half inch width.
10. Shelf Life: Period of time, usually beginning with date of manufacture, during which stored adhesive will remain effective or useful.
11. 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).
12. Stability: Ability of material to remain unchanged.

13. Storage Life: Period of time during which packaged adhesive can be stored under specified temperature conditions and remain suitable for use.
14. Substrate: Material upon surface of which an adhesive-containing substance is spread for any purpose, such as bonding or coating.
15. Surface Preparation: Physical and /or chemical preparation of substrate to render it suitable for adhesive joining. Same as substrate preparation or pre-bond preparation.
16. Toxicity: Material shall have no adverse effect on health of personnel when used for its intended purpose.

C. Reference Standards:

1. American Association of State and Highway Transportation Officials:
  - a. AASHTO T 132-87(2013), 'Standard Method of Test for Tensile Strength of Hydraulic Cement Mortars'.
2. ASTM International:
  - a. ASTM C639-01(2011), 'Standard Test Method for Rheological (Flow) Properties of Elastomeric Sealants'.
  - b. ASTM C661-06(2011), 'Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer'.
  - c. ASTM C679-03(2009), 'Standard Test Method for Tack-Free Time of Elastomeric Sealants'.
  - d. ASTM C719-13, 'Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)'.
  - e. ASTM C793-05(2010), 'Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants'.
  - f. ASTM C794-10, 'Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants'.
  - g. ASTM C920-14, 'Standard Specification for Elastomeric Joint Sealants'.
  - h. ASTM C1135-00(2011), 'Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants'.
  - i. ASTM C1184-13, 'Standard Specification for Structural Silicone Sealants'.
  - j. ASTM C1193-13, 'Standard Guide for Use of Joint Sealants'.
  - k. ASTM C1248-08(2012), 'Standard Test Method for Staining of Porous Substrate by Joint Sealants'.
  - l. ASTM C1330-02(2013), 'Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants'.
  - m. ASTM C1481-12 'Standard Guide for Use of Joint Sealants with Exterior Insulation & Finish Systems (EIFS)'.
  - n. ASTM D412-06(2013), 'Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension'.
  - o. ASTM D2202-00(2010), 'Standard Test Method for Slump of Sealants'.
  - p. ASTM D2240-05(2010), 'Standard Test Method for Rubber Property-Durometer Hardness'.
  - q. ASTM D5893-10, 'Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements'.
  - r. ASTM E119-12a, 'Standard Test Methods for Fire Tests of Building Construction and Materials'.
3. Federal Specifications:
  - a. Federal Specification TT-S-001543A (CON-NBS), 'Sealing Compound: Silicone Rubber Base (for Calking, Sealing & Glazing in Buildings and Other Structures)' (9 Jun 1971).
  - b. TT-S-00230C (CON-NBS), 'Sealing compound: Elastomeric Type, Single Component (For Calking, Sealing, And Glazing In Buildings And Other Structures.' (2 Feb 1970).
4. Government Services Administration (GSA), Commercial Item Descriptions (CID):
  - a. GSA CID A-A-272A, 'Sealing Compound: Silicone Rubber Base (For Caulking, Sealing, and Glazing in Buildings and Other Structures)'.
  - b. GSA CID A-A-1556, 'Sealing Compound Elastomeric Type, Single Component (For Caulking, Sealing, and Glazing in Buildings and Other Structures)'.

### 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 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 C639 or ASTM D2202: Flow (sag or slump).
    - 3) ASTM C661 or ASTM D2240: Durometer hardness (shore A).
    - 4) ASTM C679 or ASTM C794: Tack free time (peel strength).
    - 5) ASTM C719: Joint movement capability.
    - 6) ASTM 793: Effects of accelerated weathering.
    - 7) ASTM C1135 or ASTM D412: Tensile adhesion strength.
    - 8) ASTM C1184: Structural silicone sealants.
    - 9) ASTM C1248: Staining.
    - 10) ASTM D412: Modulus.
    - 11) ASTM D5893: Silicone Joint Sealant for Concrete Pavements.
    - 12) Federal Specification TT-S-001543A.
    - 13) Federal Specification TT-S-00230C.
    - 14) GSA CID A-A-272A.

- 15) GSA CID A-A-1556.
  - 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 particular 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 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) Gutters.
        - c) Penetrations in soffits and fascias.
        - d) Roof vents and flues.
        - e) Lightning protection componets.
    - b. Design Criteria:
      - 1) Meet following standards for Sealant:
        - a) ASTM C920: Type S Grade NS, Class 25 (min) Use A.
    - 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.

## 2.2 ACCESSORIES

- A. 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.
- B. 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.
- C. Joint Cleaner:
  1. Non-corrosive and non-staining type as recommended by Sealant Manufacturer, compatible with joint forming materials.
- D. 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, or frost. Prepare substrates in accordance with Manufacturer's instructions:
    - a. Porous surfaces: Abrasive-clean followed by blasting with oil-free compressed air.
    - b. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193.
    - c. High-pressure water cleaning: Exercise care that water does not enter through failed joints.
  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 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 7104 OPERATING TRIM
- 08 7106 CLOSING DEVICES
- 08 7107 PROTECTIVE PLATES AND TRIM
- 08 7108 STOPS AND HOLDERS
- 08 7109 ACCESSORIES

END OF TABLE OF CONTENTS

**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 / Canadian Standards Association:
    - a. AAMA/WDMA/CSA 101/I.S.2/A440-11, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.
  - 2. ASTM International:
    - a. ASTM A568/A568M-13a, 'Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
    - b. ASTM A653/A653M-13, '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 A250.8-2003(R2008), '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 One Approved VMR 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).
- B. Manufacturers:
  - 1. Category One 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).
    - b. Exterior Frames: 14 ga. (1.9 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 at the project site. Grind all welds smooth.
    - 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 23 3713: 'Diffusers, Registers, And Grilles, for door grilles.

**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. Adhesive, Type I (fully waterproof): Forms a bond that will retain practically all of its strength when occasionally subjected to a thorough wetting and drying; bond shall be of such quality that specimens will withstand shear and the two-cycle boil test specified in ANSI/HPVA HP (latest edition).
  - 2. 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.
  - 3. Core: The material (typically, veneer, lumber, particleboard, medium-density fiberboard, or a combination of these) on which an exposed surface material (typically, veneer or HPDL) is applied.
  - 4. Core, Solid: The innermost layer or section in flush door construction. Typical constructions are as follows:
    - a. Core, Mineral: A fire-resistant core material generally used in wood doors requiring fire ratings of 3/4 hours or more.
    - b. Particleboard - A solid core of wood or other lignocellulose particles bonded together with a suitable binder, cured under heat, and pressed into a rigid panel in a flat-platen press.
  - 5. Face Veneer: The outermost exposed wood veneer surface of a veneered wood door, panel, or other component exposed to view when the project is completed.
  - 6. 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.

7. 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.
  8. Flitch: A hewn or sawn log made ready for veneer production or the actual veneer slices of one half log, kept in order, and used for the production of fine plywood panels.
  9. 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.
  10. Plain Slicing: Most commonly used for hardwood plywood. The log is cut in half, and one half is placed onto a carriage and moved up and down past a fixed knife to produce the veneers. Veneer is sliced parallel to the pith of the log and approximately tangent to the growth rings to achieve flat-cut veneer. Each piece is generally placed in a stack and kept in order. One half log, sliced this way, is called a "flitch."
  11. 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.
  12. Stile-and-Rail Construction: A technique often used in the making of doors, wainscoting, and other decorative features for cabinets and furniture. The basic concept is to capture a panel within a frame, and in its most basic form it consists of five members: the panel and the four members that make up the frame. The vertical members of the frame are called stiles, while the horizontal members are known as rails.
- D. Reference Standards:
1. American Architectural Manufacturers Association / Window & Door Manufacturers Association / Canadian Standards Association:
    - a. AAMA/WDMA/CSA 101/I.S.2/A440-11, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.
  2. ASTM International:
    - a. ASTM C1036-11, 'Standard Specification for Flat Glass'.
    - b. ASTM C1048-12, 'Standard Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass'.
  3. Hardwood, Plywood, and Veneer Association:
    - a. HPVA HP-1-2009 '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 Red Oak 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 One Approved VMR 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).
- 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 Red Oak 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. Verify to match existing doors in building.
  5. Core:
    - a. Fully bonded to stiles and rails and sanded as a unit before applying veneers.
    - b. Non-Rated And Fire-rated, AWS FD 1/3:
      - 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 06 4114: 'Wood-Veneer-Faced Architectural Cabinets' for architectural woodwork hardware.
  - 3. Section 08 0601: 'Hardware Group and Keying Schedules'.
  - 4. Section 08 4113: 'Aluminum-Framed Entrances and Storefronts' for storefront hardware.

**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. American National Standards Institute / Builders Hardware Manufacturers Association:
    - a. ANSI/BHMA A156.1-2013, 'Butts & Hinges'.
    - b. ANSI/BHMA A156.3-2008, 'Exit Devices'.
    - c. ANSI/BHMA A156.4-2013, 'Door Controls-Closers'.
    - d. ANSI/BHMA A156.5-2014, 'Cylinders and Input Devices for Locks'.
    - e. ANSI/BHMA A156.6-2010, 'Architectural Door Trim'.
    - f. ANSI/BHMA A156.12-2013, 'Interconnected Locks & Latches'.
    - g. ANSI/BHMA A156.13-2012, 'Mortise Locks & Latches, Series 1000'.
    - h. ANSI/BHMA A156.18-2012, 'Materials and Finishes'.
    - i. ANSI/BHMA A156.19-2013, 'Power Assist and Low Energy Power Operated Doors'.
    - j. ANSI/BHMA A156.21-2014, 'American National Standard for Thresholds'.
    - k. ANSI/BHMA A156.30-2014, 'American National Standard for High Security Cylinders'.
    - l. ANSI/BHMA A156.36-2010, 'American National Standard for Auxiliary Locks'.
  - 2. International Code Council / American National Standards Institute:
    - a. ICC / ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.
  - 3. Underwriters Laboratories (UL):
    - a. UL 10B, 'Fire Tests of Door Assemblies'.
    - b. UL 10C, 'Positive Pressure Fire Tests of Door Assemblies'.

**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. Category One VMR Approved Suppliers. See Section 01 6200 for definitions of Categories:
    - 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).

### 2.2 FINISHES

- A. Hardware Finishes:
  - 1. Match existing door hardware finishes in building.

### **2.3 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**

**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, New Britain, CT [www.stanleyworks.com](http://www.stanleyworks.com).
- B. Hinges:
  - 1. Sizes:
    - a. **1-3/4 inch (45 mm)** doors and fire-rated doors in metal frames:
      - 1) Standard: **4-1/2 inches by 4-1/2 inches (115 mm by 115 mm)**.
      - 2) Wide Throw: **4-1/2 inches (115 mm)** by width required.
  - 2. Use non-removable pins on exterior opening doors.
  - 3. 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.

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

**SECTION 08 7103****SECURING DEVICES****PART 1 - GENERAL****1.1 SUMMARY**

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 – Not Used**

**END OF SECTION**

**SECTION 08 7104**

**OPERATING TRIM**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
  - 1. Interior push / pulls.
- B. Related Requirements:
  - 1. Section 08 7101: Common Hardware Requirements and VMR Suppliers.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURED UNITS**

- A. Standard Door Push / Pulls:
  - 1. Size: 15 inches (380 mm) by 3-1/2 inch (89 mm).
  - 2. Type Two Acceptable Products:
    - a. PS3515, PL3515 / 80301 by Glynn-Johnson, Indianapolis, IN [www.glynn-johnson.com](http://www.glynn-johnson.com).
    - b. 39E, 30S by Hager, St Louis, MO [www.hagerhinge.com](http://www.hagerhinge.com).
    - c. 8200, 8302 by Ives, Wallingford, CT [www.iveshardware.com](http://www.iveshardware.com).
    - d. 70B, 105x70B by Rockwood Manufacturing Co, Rockwood, PA [www.rockwoodmfg.com](http://www.rockwoodmfg.com).
    - e. Equal as approved by Architect before installation. See Section 01 6200.

**PART 3 - EXECUTION: Not Used**

**END OF SECTION**

**SECTION 08 7106****CLOSING DEVICES****PART 1 - GENERAL****1.1 SUMMARY**

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

**1.2 SUBMITTALS**

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Manufacturer's final, executed copy of warranty.

**1.3 WARRANTY**

- A. Manufacturer Warranty:
  - 1. Manufacturer's Standard Warranty, five (5) years minimum.

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

- A. Manufacturers:
  - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. 7900 Series by Dorma Architectural Hardware, Reamstown, PA [www.dorma.com/usa](http://www.dorma.com/usa).
    - b. 1461 Series by LCN Closers, Princeton, IL [www.lcnclosers.com](http://www.lcnclosers.com).
    - c. 8501 Series by Norton Door Controls, Charlotte, NC [www.nortondoorcontrols.com](http://www.nortondoorcontrols.com).
    - d. 1431 Series by Sargent, New Haven, CT [www.sargentlock.com](http://www.sargentlock.com).
    - e. D-3550/D-3551 Series by Stanley, Indianapolis IN [www.stanlesecuritysolutions.com](http://www.stanlesecuritysolutions.com).
- B. Surface-Mounted Overhead Door Closers:
  - 1. Closers provided under this Section shall be from same Manufacturer.
  - 2. Provide parallel arms on closers unless door position in relation to adjacent wall requires otherwise. Provide covers.
- C. Surface-Mounted Overhead Door Closers:
  - 1. Closers provided under this Section shall be from same Manufacturer.
  - 2. Provide parallel arms on closers unless door position in relation to adjacent wall requires otherwise. Provide covers.
  - 3. Closers shall have following features:
    - 1) Adjustable sweep speed.
    - 2) Adjustable backcheck.
    - 3) Non-handed, non-sized.
  - 4. Closer arm functions:
    - a. Cushion stop.

- 1) LCN CUSH-N-STOP 1461-3077CNS.
- 2) Equal approved by Architect prior to installation.
- b. Regular.
  - 1) LCN Regular 1461-3077.
  - 2) Equal approved by Architect prior to installation.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Mount closers on stop side of door wherever conditions permit.
- B. Through-bolt hardware-to-door connections.

#### **3.2 ADJUSTING**

- A. Adjust closers to provide maximum opening force as required by governing code authority and proper backcheck and sweep speed.

**END OF SECTION**

**SECTION 08 7107****PROTECTIVE PLATES AND TRIM****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
  - 1. Kick plates.
- B. Related Requirements:
  - 1. Section 08 7101: Common Hardware Requirements and VMR Suppliers.

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

- A. Manufacturers:
  - 1. Type Two Acceptable Manufacturers:
    - a. Glynn-Johnson, Indianapolis, IN [www.glynn-johnson.com](http://www.glynn-johnson.com).
    - b. Hager, St Louis, MO (800) 255-3590 or (314) 772-4400 [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. Equal as approved by Architect before installation. See Section 01 6200.
- B. Protective Plates:
  - 1. Material: 0.050 inch (1.27) mm thick Stainless Steel.
  - 2. Sizes:
    - a. Kick Plates: 10 inches (255) mm high by width of door less 3/4 inch (19 mm) on each side.

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

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

- A. Products Furnished But Not Installed Under This Section:
  - 1. Smoke Gaskets.
- B. Related Requirements:
  - 1. Section 08 7101: 'Common Finish Hardware Requirements' for general finish hardware requirements and Approved Suppliers.
  - 2. Section 09 3013: 'Ceramic Tiling' for stone thresholds.

**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. Smoke Gaskets:
  - 1. Color as selected by Architect.
  - 2. Type One Acceptable Products:
    - a. 726 by Hager.
    - b. 5050 by NGP.
    - c. PK55 by Pemko.
    - d. Equal as approved by Architect before bidding. See Section 01 6200.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install smoke gaskets 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.

**END OF SECTION**



## **DIVISION 09: FINISHES**

### **09 3000 TILING**

09 3013 CERAMIC TILING

### **09 9000 PAINTS AND COATINGS**

09 9001 COMMON PAINTING AND COATING REQUIREMENTS

09 9122 INTERIOR PAINTED CMU

09 9123 INTERIOR PAINTED GYPSUM BOARD, PLASTER

09 9413 INTERIOR TEXTURED FINISHING

END OF TABLE OF CONTENTS

**SECTION 09 3013**

**CERAMIC TILING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install ceramic tile and tile setting materials and accessories as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 2900: 'Gypsum Board' for installation of backerboard behind ceramic tile, except for joint reinforcing.
  - 2. Section 22 1319: 'Facility Sanitary Sewer Specialties' for floor drains installed in ceramic tile floors.
- C. Products Installed But not Furnished Under This Section:
  - 1. Interior Ceramic Tile Joint Sealants:
- D. Related Requirements:
  - 1. Section 07 9213: 'Elastomeric Joint Sealants'.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. American National Standard Specification (ANSI) for the Installation of Ceramic Tile.
  - 2. International Standards Organization (ISO) 13007, 'Classification for Adhesives and Grout'.
  - 3. Tile Council of North America:
    - a. TCNA Handbook, 'Handbook for Ceramic, Glass, and Stone Tile Installation, 2015'.
- B. Definitions:
  - 1. Crack Isolation: Prevention of transfer of cracks from substrate through tile or stone when substrate is subjected to horizontal movement of cracks.
  - 2. Dynamic Coefficient of Friction (DCOF): Measures ratio of forces necessary to keep two surfaces sliding.
  - 3. Epoxy Grout: Mortar system employing epoxy resin and epoxy hardener portions.
  - 4. Grout: Rich or strong cementitious or chemically setting mix used for filling tile joints.
  - 5. ISO 13007 Standards Product Classifications:
    - a. Adhesives:

Types	Classes	Special Characteristics
C = Cementitious (Thin-Set Mortars)	1 = Normal 2 = Improved	F = Fast-Setting T = Slip-Resistant E = Extended Open Time S1 = Deformable S2 = Highly Deformable P1 = Plywood Adhesion P2 = Improved Plywood Adhesion
D = Dispersion (Mastics)	1 = Normal 2 = Improved	F = Fast-Setting T = Slip-Resistant

		E = Extended Open Time
R = Reaction Resin (Epoxies)	1 = Normal 2 = Improved	T = Slip-Resistant

- 1) Cementitious Adhesive (C): Mixture of hydraulic binding agents (e.g. portland cement), aggregates, and organic additives (e.g. latex polymers, moisture retention additive, etc...) to be mixed with water or latex admix before mixing.
- 2) Dispersion Adhesive (D): Ready-to-use mixture of organic binding agents in the form of an aqueous polymer dispersion, organic additives and mineral fillers - mastic type products.
- 3) Reaction Resin Adhesive (R): Single or multi-component mixture of synthetic resin, mineral fillers and organic additives in which curing occurs by chemical reaction – epoxy or urethane based products.
- 4) Class 1 (1): Adhesive has passed minimum pass level tests that are mandatory for that adhesive type.
- 5) Class 2 (2): Adhesive has passed same tests as Class 1 and/or other applicable tests, but at higher pass levels.
- 6) Fast-Setting (F): Adhesive with accelerated cure time that must achieve minimum strength requirements of fast setting adhesive. This designation does not apply to reaction resin adhesives (R).
- 7) Slip-Resistance (T): Downward movement of a tile applied to combed adhesive layer on vertical surface must be ≤ 0.5mm for a C or D adhesive, and ≤ 5mm for a type R adhesive.
- 8) Extended Open Time (E): Maximum time interval after application at which tiles can be embedded in applied adhesive and meet tensile adhesion strength requirement must be ≥ 30 minutes. This designation does not apply to reaction resin adhesives (R).
- 9) Deformability (S): Capacity of hardened adhesive to be deformed by stresses between tile and substrate without damage to installed surface – to pass S1 requirements an adhesive must be able to deform ≥ 2.5mm but < 5mm; to pass S2 requirements an adhesive must be able to deform ≥ 5mm. This designation does not apply to reaction resin adhesives (R).
- 10) Exterior Glue Plywood (P): Adhesive with ability to bond tile or stone to exterior glue plywood substrates (interior only). This designation does not apply to reaction resin adhesives (R) or dispersion adhesives (D).

b. Grouts:

Types	Classes	Special Characteristics
CG = Cementitious Grout	1 = Normal 2 = Improved	F = Fast-Setting A = High Abrasion Resistance W = Reduced Water Absorption
RG = Reaction Resin Grouts	1 = Normal 2 = Improved	Higher performance characteristics than improved cementitious grouts

- 1) Cementitious Grout (CG): Mixture of hydraulic binding agents (e.g. portland cement), aggregates, inorganic and organic additives (e.g. latex polymers, moisture retention additive, etc...).
- 2) Reaction Resin Grout (RG): Single or multi-component mixture of synthetic resin, mineral fillers and organic additives in which curing occurs by chemical reaction – epoxy or urethane based products.
- 3) Class 1 (1): Grout has passed minimum pass level tests that are mandatory for cementitious grouts.
- 4) Class 2 (2): Cementitious grout has passed same tests as Class 1 and/or other applicable tests, but at higher pass levels.
- 5) Fast-Setting (F): Grout with accelerated cure time that must achieve minimum compressive strength requirements under normal conditions within twenty four (24) hours. This designation applies only to cementitious grouts (CG).

- 6) High Abrasion Resistance (A): Capability of grout to resist wear. This designation applies only to cementitious grouts (CG).
- 7) Reduced Water Absorption (W): Grout has lower water absorption rate than standard cementitious grout. This designation applies only to cementitious grouts (CG).
6. Latex/Polymer Modified Portland Cement Mortar: Latex/Polymer modified portland cement mortar is a mixture of portland cement, sand, and special latex/polymer additive that is used as a bond coat for setting tile.
7. Pavers: Unglazed porcelain or natural clay tile formed by dust-pressed method and similar to ceramic mosaics in composition and physical properties but relatively thicker with 6 inch - or more of facial area. (ASTM C242).
8. Sanded Cement Grout: Factory prepared mixture of cement, graded sand, and other ingredients to produce water-resistant, dense, uniformly colored material. Used for joints of **1/8 inch (3 mm)** width or greater.
9. Static Coefficient of Friction (SCOF): Measures ratio of forces necessary to start two surfaces sliding (older measurement of friction replaced by dynamic coefficient of friction (DCOF)).
10. Unsanded Cement Grout: Factory prepared mixture of cement and additives that provide water retentivity. Used for joints of **1/8 inch (3 mm)** or less.

C. Reference Standard:

1. American National Standards Institute:
  - a. ANSI A108/A118/A136.1, 'American National Standards Specifications for the Installation of Ceramic Tile', Version 2013.1 (compilation of standards):
    - 1) Installation Standards:
      - a) A108.01, 'General Requirements: Subsurfaces and Preparation by Other Trades'.
      - b) A108.02, 'General Requirements: Materials, Environmental, and Workmanship'.
      - c) A108.05, 'Installation of Ceramic Tile with Dry-Set Portland Cement Mortar of Latex-Portland Cement Mortar'.
      - d) A108.6, 'Installation of Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy'.
      - e) A108.10, 'Installation of Grout in Tilework'.
      - f) A108.17, 'Installation of Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone'.
    - 2) Material Specifications:
      - a) A118.1, 'Dry-Set Portland Cement Mortar'.
      - b) A118.3, 'Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive'.
      - c) A118.4, 'Latex Portland Cement Mortar'.
      - d) A118.6, 'Cement Grouts for Tile Installation'.
      - e) A118.7, 'High-Performance Polymer Modified Latex/Portland Cement Grouts for Tile Installation'.
      - f) A118.10, 'Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installations'.
      - g) A118.12, 'Crack Isolation Membranes for Thin-set Ceramic Tile and Dimension Stone Installations'.
  - b. ANSI A137.1, 'National Standard Specifications for Ceramic Tile'.
2. ASTM International:
  - a. ASTM A1064/A1064M-16a, 'Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete'.
  - b. ASTM C144-11, 'Standard Specification for Aggregate for Masonry Mortar'.
  - c. ASTM C150/C150M-16, 'Standard Specification for Portland Cement'.
  - d. ASTM C206-14, 'Standard Specification for Finishing Hydrated Lime'.
  - e. ASTM C207-06(2011), 'Standard Specification for Hydrated Lime for Masonry Purposes'.
  - f. ASTM C242-15, 'Standard Terminology of Ceramic Whitewares and Related Products'.
  - g. ASTM C373-16, 'Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products'.
  - h. ASTM C482--02(2014), 'Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement Paste'.
  - i. ASTM C501-84(2015), 'Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser'.
  - j. ASTM C648-04(2014), 'Standard Test Method for Breaking Strength of Ceramic Tile'.

- k. ASTM C847-14a, 'Standard Specification for Metal Lath'.
- 3. International Organization for Standardization:
  - a. ISO 13007-1-2013, 'Ceramic tiles - Grouts and adhesives - Part 1: Terms, definitions and specifications for adhesives'.
  - b. ISO 13007-2-2013, 'Ceramic tiles - Grouts and adhesives - Part 2: Test methods for adhesives'.
  - c. ISO 13007-3-2013, 'Ceramic tiles - Grouts and adhesives - Part 3: Terms, definitions and specifications for grouts'.
  - d. ISO 13007-4-2013, 'Ceramic tiles - Grouts and adhesives - Part 4: Test methods for grouts'.
- 4. Tile Council of North America:
  - a. TCNA F111-15, 'On-Ground or Above-Ground Concrete, Unbonded Mortar Bed, Ceramic Tile'.
  - b. TCNA F115-15, 'On-Ground Concrete, Ceramic Tile, Epoxy or Furan Grout'.
  - c. TCNA W244c-15, 'Wood or Metal Studs, Cement Backer Board, Ceramic Tile'.
  - d. TCNA W245-15, 'Wood or Metal Studs, Coated Glass Mat Water-Resistant Gypsum Backer Board, Ceramic Tile'.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. In addition to agenda items specified in Section 01 3100, review following:
    - a. Review installation scheduling, coordination with related work, and placement of tile.
    - b. Review Manufacturer's installation requirements, submittals, and Installers requirements to assure issuance of Manufacturer's system warranty.
    - c. Review surface preparation.
    - d. Review water-proofing and crack isolation membrane requirements.
    - e. Review tile base installation requirements.
    - f. Review floor tile grout thickness requirements.

### 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Samples:
    - a. 24 inch (600 mm) square sample on specified tile backer showing all types of tile, grout, and colors specified in this Section. 1/2 of sample board shall show floor tile and 1/2 shall show wall tile.
    - b. One sample of each type of base tile and trim piece to be used on Project.
- B. Informational Submittals:
  - 1. Certificates:
    - a. Master grade certificate.
      - 1) Conform to ANSI A137.1.
  - 2. Manufacturer's Instructions:
    - a. Provide instructions for installation of tile-setting materials.
  - 3. Source Quality Control Submittals:
    - a. Provide Manufacturer documentation indicating proposed materials will satisfy requirements for Manufacturer's Warranty.
  - 4. Qualification Statement. See Section 01 4301 for qualifications:
    - 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. Warranty Documentation:
      - 1) Include copy of final, executed warranty.

- c. Record Documentation:
  - 1) Manufacturers Documentation:
    - a) Source Quality Control Submittal documentation showing materials will satisfy requirements for Manufacturer's Warranty.
    - b) Manufacturer's cut sheets of materials used in installed system.
    - c) Tile color and pattern selections.

## 1.5 QUALITY ASSURANCE

- A. Source Of Materials:
  - 1. Provide materials obtained from one (1) source for each type and color of tile, grout, and setting materials for Manufacture's system warranty.
- B. Qualifications:
  - 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
    - a. Minimum three (3) years' experience installing specified tile installations.
    - b. Minimum five (5) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.
    - c. Upon request, submit documentation.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver and store packaged materials in their original unopened containers with labels intact until time of use.
- B. Storage and Handling Requirements:
  - 1. Store and handle materials in a manner to prevent damage or contamination by water, freezing, or foreign matter.
  - 2. Keep grade seals intact and cartons dry until tile are used.

## 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Do not apply tile setting materials to surfaces that contain frost.
  - 2. Keep ambient temperatures of area to receive tile work and surface temperatures of substrates at 50 deg F (10 deg C) minimum during preparation of mortar bed, laying of tile, and for seventy-two (72) hours after completion of tile work. Use electric heat to prevent discoloration of grout.
  - 3. Temperature of substrate shall be 60 deg F (15.6 deg C) and rising for application of epoxy and furan unless otherwise specifically authorized by Manufacturer.
  - 4. Maintain epoxy at stable temperature between 60 deg F (15.6 deg C) and 90 deg F (32 deg C) during curing period.

## 1.8 WARRANTY

- A. Manufacturer Warranty:
  - 1. Mortar Manufacturer's twenty-five (25) year minimum system warranty on tile-setting materials for surface preparation, setting materials and grouting materials; includes replacement of defective materials and deterioration, including replacement of tile and labor and materials when products purchased are used within their shelf life and installed in accordance to Manufacturers written instructions and industry standard guidelines.

**PART 2 - PRODUCTS****2.1 SYSTEMS****A. Manufacturers:****1. Manufacturer's Contact List:**

- a. Ardex Engineered Cements, Aliquippa, PA [www.ArdexAmericas.com](http://www.ArdexAmericas.com).
  - 1) Contact Information: Don Richards (206) 979-0401  
[www.Don.richards@ArdexAmericas.com](mailto:www.Don.richards@ArdexAmericas.com).
- b. Custom Building Products, Seal Beach, CA [www.custombuildingproducts.com](http://www.custombuildingproducts.com).
  - 1) Contact Information: John Gallup (206) 718-6024 [johng@cbpmail.net](mailto:johng@cbpmail.net).
- c. Dal-Tile Corp., Div. of Mohawk Industries, Dallas, TX [www.daltile.com](http://www.daltile.com).
- d. Interceramic Inc., Garland, TX [www.interceramic.com](http://www.interceramic.com).
- e. Laticrete International Inc., Bethany, CT [www.laticrete.com](http://www.laticrete.com).
- f. Mapei Americas Headquarters, Deerfield Beach, FL [www.mapei.com](http://www.mapei.com).
  - 1) Contact Information: Bart A. Wilde (801) 467-2060 [www.bwilde@mapei.com](mailto:www.bwilde@mapei.com).
- g. Merkrete, by Parex USA, Inc., Anaheim, CA [www.merkrete.com](http://www.merkrete.com).
  - 1) Contact Information: Andy Townes (505) 873-1181 [andy.townes@parexusa.com](mailto:andy.townes@parexusa.com).
- h. Schuler Systems L.P., Plattsburgh, NY [www.schluter.com](http://www.schluter.com).

**B. Category Two National Contract Suppliers. See Section 01 6200 for definitions of Categories:****1. Contact following suppliers to procure components of tile assembly:**

- a. Daltile And Stone, Salt Lake City, UT:
  - 1) LDS Project Coordinators:
    - a) Russ Green and Larry McCleary, (801) 487-9901, cell (801) 301 1461, fax (801) 487-0345 [larry.mccleary@daltile.com](mailto:larry.mccleary@daltile.com) - [www.daltileproducts.com](http://www.daltileproducts.com) or [www.daltilegreenworks.com](http://www.daltilegreenworks.com).
- b. Interceramic:
  - 1) LDS Project Coordinators:
    - a) First Contact: Diego Chavez, phone (214) 503-5433, fax (877) 551-1979 [dichavez@interceramic.com](mailto:dichavez@interceramic.com).
    - b) Second Contact: Jose Valdez, phone (214) 503-5507, fax (877) 551-1979 [jvaldez@interceramic.com](mailto:jvaldez@interceramic.com).

**C. Design Criteria:****1. General:**

- a. Paver Tile: Standard grade porcelain tile, solid color throughout, graded in accordance with ANSI A137.1:
  - 1) Cove Base with external and internal corner pieces shall be standard grade.
- b. Ceramic Tile:
  - 1) Tile shall be standard quality, white or off-white body, square or cushion edge, graded in accordance with ANSI A137.1.
  - 2) Square edge, white body, lug type wall tile. Field wall tile shall have two lugs on each edge to assure uniform joint, approximately **0.040 inch (one mm)**.
  - 3) External and internal corner pieces shall be standard grade.

**2. Capabilities:****a. Paver Tile:**

- 1) Water Absorption when tested in accordance with ASTM C373: 0.1 to 0.5 percent.
- 2) Abrasive Wear Resistance when tested in accordance with ASTM C501: 275 minimum.
- 3) Breaking Strength when tested in accordance with ASTM C648: 300 lbs minimum.
- 4) Bond Strength when tested in accordance with ASTM C482: 200 psi minimum.
- 5) Coefficient of Friction: 0.42 minimum as measured by DCOF (Dynamic Coefficient of Friction) AcuTest method and requirements as per ANSI A137.1.

**D. Description:****1. Paver Tile:****a. Tile Sizes:**

- 1) Finished floor with slope shown on Contract Documents: **8 inches (200 mm)** square:
  - a) Cove Base: External and internal corner pieces to match with bull-nosed top:

- (1) 6 inches by 8 inches (150 mm by 200 mm) with bull-nosed top.
      - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) Daltile.
    - b. Category Four Approved Colors. See Section 01 6200 for definitions of Categories:
      - 1) CD05 Bianco Alpi by Daltile.
      - 2) Dotti Ivory by Interceramic.
  - 2. Ceramic Tile:
    - a. Wall Tile:
      - 1) Walls: 6 inch by 6 inch (150 mm by 150 mm).
      - 2) Category Four Approved Colors. See Section 01 6200 for definitions of Categories:
        - a) Room Walls:
          - (1) 0100 White by Daltile.
          - (2) Bone by Interceramic.
        - b) Accent Color:
          - (1) 0135 Almond by Daltile.
          - (2) Canvas by Interceramic.
- E. Materials:
  - 1. Paver Tile:
    - a. Category Four Approved Products. See Section 01 6200 for definition of Categories:
      - 1) Porcelato Graniti by Daltile.
      - 2) Intertech Unglazed by Interceramic.
  - 2. Wall Tile:
    - a. Category Four Approved Products. See Section 01 6200 for definition of Categories:
      - 1) Semi-Gloss or Matte by Dal-Tile.
      - 2) IC Brites or Mattes or Bold Tones Series by Interceramics.
  - 3. Mortar Bed:
    - a. Portland Cement: Meet requirements of ASTM C150/C150M, Type 1, designation shall appear on bag.
    - b. Hydrated Lime:
      - 1) Meet Requirements of one of following:
        - a) ASTM C206.
        - b) ASTM C207, Type S (designation shall appear on bag).
    - c. Sand: Clean, washed, well-graded, meeting requirements of ASTM C144 with gradation of 100 percent passing No. 8 sieve with not over five (5) percent passing No. 100 sieve.
    - d. Latex Additive; in lieu of all water:
      - 1) Design Criteria:
        - a) Meet material specification requirements of ANSI A118.4 or ANSI 118.11.
        - b) Meet ANSI installation specification requirements of ANSI A108.5.
        - c) Expansion joints complies with TCA method EJ171.
      - 2) Type Two Acceptable Products:
        - a) ARDEX: Ardex E 90 Mortar Admix.
        - b) CUSTOM: Thin-Set Mortar Admix.
        - c) LATICRETE: 4237 Latex Additive with 211 Powder.
        - d) MAPEI: Planicrete AC.
        - e) MERKRETE: 150 Latex Admixture.
  - 4. Metal Trim:
    - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Tile / Carpet Junction: Schluter-RENO-AETK.
      - 2) Over Expansion Joints In Slabs: Schluter DILEX-BWS, color G, PG, or HB as selected by Architect.
  - 5. Joint Sealants:
    - a. Interior Ceramic Tile Joints are furnished in Section 07 9213 and installed in Section 09 3013 'Ceramic Tiling' including the following:
      - 1) Ceramic and paver cove base inside corners.
      - 2) Ceramic and paver tile joints.
      - 3) Pavel tile base to paver floor tile joints.
  - 6. Backer Board Joint Reinforcing: 2 inch (50 mm) wide glass fiber mesh tape.
  - 7. Tile Setting Products:



- a. Use only products of same Manufacturer to validate warranty, unless otherwise acceptable to Ceramic Tile Supplier.
- b. Use only products that meet Mortar Manufacturer's twenty five (25) year system warranty requirements.
- c. Latex-Portland Cement Mortar For Floors:
  - 1) Design Criteria:
    - a) Meet ANSI material specification requirements of ANSI 118.4, ANSI 118.11, or ANSI A118.15.
    - b) Meet ANSI installation specification requirements of ANSI A108.4 or ISO material specification ISO13007 installation material specification and . C2ES1P2 performance requirements for adhesive.
  - 2) Category Four Approved Products. See Section 01 62 00 for definitions of Categories:
    - a) ARDEX: Ardex X77.
    - b) CUSTOM: Megalite Crack Prevention Mortar or FlexBond Premium Crack Prevention Thin-set Mortar (no additives needed).
    - c) LATICRETE: 254 Platinum Thinset.
    - d) MAPEI: Ultraflex 3.
    - e) MERKRETE: 735 Premium Flex.
- d. Latex/Polymer Modified Portland Cement Mortar For Walls:
  - 1) Design Criteria:
    - a) Meet ANSI material specification requirements of ANSI 118.4, ANSI 118.11, or ANSI A118.15.
    - b) Meet ANSI installation specification requirements of ANSI A108.4 or ISO material specification ISO13007 installation material specification and C2ES1P2 performance requirements for adhesive.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) ARDEX: Ardex X77.
    - b) CUSTOM: Megalite Thin-Set Mortar or FlexBond Fortified Thin-Set Mortar.
    - c) LATICRETE: 254 Platinum Thinset.
    - d) MAPEI: Ultraflex 3.
    - e) MERKRETE: 735 Premium Flex.
- e. Floor Grout (Epoxy):
  - 1) Design Criteria:
    - a) Meet ANSI material specification requirements of ANSI 118.3.
    - b) Meet ANSI installation specification requirements of ANSI A108.6 and ISO material specification ISO13007 RG.
  - 2) Approved Color:
    - a) ARDEX: 25 Stormy Mist.
    - b) CUSTOM: No. 145 Light Smoke.
    - c) LATICRETE: No. 24 Natural Grey.
    - d) MAPEI: No. 11 Sahara Beige.
    - e) MERKRETE: Pro Epoxy D-153 Buckskin.
  - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) ARDEX: Ardex WA.
    - b) CUSTOM: CEG-Lite 100% Solids Commercial Epoxy Grout.
    - c) LATICRETE: SpectraLOCK PRO.
    - d) MAPEI: Kerapoxy (sanded).
    - e) MERKRETE: Pro Epoxy.
- f. Wall Grout (Modified Polymer):
  - 1) Design Criteria:
    - a) Meet ANSI material specification requirements of ANSI A118.6 or ANSI A118.7.
    - b) Meet ANSI installation specification requirements of ANSI 108.10 or ISO material specification ISO13007 C2ES1P2.
  - 2) Color:
    - a) ARDEX: No. 01 Polar White.
    - b) CUSTOM: No. 381 Bright White.
    - c) LATICRETE: No. 44 Bright White.
    - d) MAPEI: No. 00 White.
    - e) MERKRETE: D-11 Snow White.
  - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

- a) ARDEX: Ardex FH.
- b) CUSTOM: PolyBlend Non-Sanded Grout or Prism Color Consistent Grout.
- c) LATICRETE: 1600 Series Unsanded Dry Set Wall Grout with 1776 Grout Admix Plus additive.
- d) MAPEI: Keracolor-U Unsanded Polymer-Modified Grout.
- e) MERKRETE: Non-Sanded ColorGrout, latex modified.
- g. Waterproofing Membrane:
  - 1) Design Criteria:
    - a) Meet ANSI installation specification requirements of ANSI 108.10.
    - b) ANSI installation specification requirements not required.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions for Categories:
    - a) Troweled applied, cement based:
      - (1) ARDEX: Ardex 8+9.
      - (2) MAPEI: Mapelastic 315.
    - b) Liquid applied, latex based:
      - (1) CUSTOM: RedGard Waterproofing or Crack Prevention Membrane or FractureFree Crack Prevention Membrane.
      - (2) LATICRETE: Hydro Ban.
      - (3) MAPEI: Mapelastic AquaDefense.
      - (4) MERKRETE: Hydro-Guard SP-1.
- h. Crack Isolation Membrane:
  - 1) Design Criteria:
    - a) Meet ANSI installation specification requirements of ANSI 118.12.
    - b) ANSI installation specification requirements not required.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions for Categories:
    - a) Flexible, thin, load-bearing, fabric-reinforced:
      - (1) ARDEX: Ardex 8+9 with SK Mesh Tape.
      - (2) CUSTOM: Crack Buster Pro Crack Prevention Mat Underlayment, with Peel & Stick Primer.
      - (3) LATICRETE: Blue 92 Anti-Fracture Membrane.
      - (4) MAPEI: Mapeguard 2, and Primer SM.
      - (5) MERKRETE: Hydro-Guard SP-1.
    - b) Liquid applied, latex based:
      - (1) CUSTOM: RedGard Waterproofing and Crack Prevention Membrane or FractureFree Crack Prevention Membrane.
      - (2) LATICRETE: Hydro Ban.
      - (3) MAPEI: Mapelastic AquaDefense.
      - (4) MERKRETE: Fracture Guard 5000.
- i. Stone Thresholds:
  - 1) Texture and color variation shall be within limits established by Architect's approved sample.
  - 2) Free of defects that would materially impair strength, durability, and appearance.
  - 3) Finish: 80 grit exterior hone.
  - 4) White marble, one (1) piece, **7/8 inch (22 mm)** thick by **2 1/2 inches (64 mm)** by door opening width. Cross-section to meet handicap accessibility requirements.

F. Mixes:

1. Mortar Beds:

	Portland Cement	Dry Sand	Damp Sand	Hydrated Lime*
Floor Mix	One Part	5 Parts	4 Part	1/10 Part
Wall Mix	One Part	- -	5-1/2 to 7 Parts	1/2 Part

\* Optional

**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 substrates where tile will be installed for compliance with requirements for installation tolerances and other conditions effecting performance of installed tile.
  2. Verify tile substrate is well cured, dry, clean, and free from oil or waxy films, and curing compounds.
  3. Notify Architect in writing if surfaces are not acceptable to install tile:
    - a. Do not lay tile over unsuitable surface.
    - b. Commencing installation constitutes acceptance of surfaces and approval of existing conditions.

**3.3 PREPARATION**

- A. Surface Preparation:
1. Allow concrete to cure for twenty-eight (28) days minimum before application of mortar bed.
  2. Repair and clean substrate in accordance with installation standards and manufacturer's instructions.

**3.4 INSTALLATION**

- A. Interface With Other Work:
1. Grounds, anchors, plugs, hangers, door frames, electrical, mechanical, and other work in or behind tile shall be installed before tile work is started.
- B. Special Techniques:
1. Install in accordance with following latest TCNA installation methods:
    - a. Flush Concrete Slabs with crack isolation membrane: TCNA F115.
    - b. Mortar Bed on Concrete Slab: TCNA F111 with reinforcing.
    - c. Framed Walls: TCNA W245 with waterproof membrane.
    - d. Tile Cove Base: TCNA Flush style.
- C. Tolerances:
1. Plane of Vertical Surfaces:
    - a. **1/8 inch in 8 feet (3 mm in 2.450 meters)** from required plane shall be plumb and true with square corners.
  2. Variation In Slab Grade:
    - a. Plus or minus **1/8 inch (3 mm)** in any **10 feet (3.050 m)** of floor slab and distance between high point and low point of slab of **1/2 inch (12.7 mm)**.
    - b. Slab Testing Procedure:
      - 1) Place ends of straightedge on **3/8 inch (10 mm)** high shims.
      - 2) Floor is satisfactory if **1/4 inch (6 mm)** diameter steel rod rolled under straightedge will not touch anywhere along **10 foot (3.050 m)** length and **1/2 inch (12.7 mm)** diameter steel rod will not fit under straightedge anywhere along **10 foot (3.050 m)** length.
- D. General:
1. Install tile in pattern indicated:
    - a. Align joints when adjoining tiles on floor, base, walls, and trim are same size.

- b. Adjust to minimize tile cutting and to avoid tile less than half size.
      - c. Center and balance areas of tile if possible.
    2. Extend tile into recesses and under equipment and fixtures to form a complete covering without interruption:
    3. Maintain heights of tilework in full courses to nearest obtainable dimension where heights are given in **feet and inches (meters and millimeters)** and are not required to fill vertical spaces exactly.
    4. Install cut tile with cuts on outer edges of field:
      - a. Provide straight cuts that align with adjacent materials.
      - b. When possible, smooth cut edges of tile or use appropriate cutter or wet saw to produce smooth cuts.
      - c. Do not install tile with jagged or flaked edges.
    5. Terminate tile neatly at obstructions, edges, and corners, without disruption of pattern or joint alignment:
      - a. Fit tile closely where edges are to be covered by trim, escutcheons, or similar devices.
    6. Provide straight tile joints of uniform width, subject to variance in tolerance allowed in tile size:
      - a. Make joints smooth and even, without voids, cracks, or excess mortar or grout.
    7. Use a beating block and hammer or rubber mallet so faces and edges of individual tiles are flush and level with faces and edges of adjacent tiles, and to reduce lippage.
    8. Accessories in tilework shall be evenly spaced, properly centered with tile joints, and level, plumb, and true to correct projection.
    9. Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
  - E. Application On Concrete Floor:
    1. On Mortar Bed:
      - a. Apply mortar bed to depth equal to depression in slab minus **1/2 inch (12.7 mm)**.
      - b. Properly cure before installing tile.
    2. Clean substrate surface thoroughly.
      - a. Dampen if very dry, but do not saturate.
    3. Install tile with 100 percent contact with mortar bed.
      - a. Obtaining 100 percent contact may require troweling mortar layer on back of each tile before placing on mortar bed.
    4. Install base by flush method (square or thin-lip method is not acceptable):
      - a. Allow for expansion joint directly above any expansion or control joints in slab.
    5. Insert temporary filler in expansion joints.
  - F. Application Of Mortar:
    1. Do not spread more mortar than can be covered within ten (10) to fifteen (15) minutes:
      - a. If 'skinning' occurs, remove mortar and spread fresh material.
      - b. Spread mortar with notches running in one (1) direction, perpendicular to pressing, pushing and pulling of tile during placement.
    2. Install tile before mortar has started initial cure:
      - a. For thin set mortar application, use notch trowel that will achieve the recommended coverage of mortar after tiles have been installed.
    3. Place tile in fresh mortar, press, push and pull tile slightly to achieve as near 100 percent coverage and contact of tile with setting material and substrate as possible:
      - a. Average contact area shall be not less than eighty (80) percent except on exterior or shower installations where contact area shall be ninety-five (95) percent when not less than three (3) tiles or tile assemblies are removed for inspection. The eighty (80) percent or ninety-five (95) percent coverage shall be sufficiently distributed to give full support of the tile.
      - b. Support corners and edges with mortar leaving no hollow corners or edges.
    4. Install so there is **1/8 inch (3 mm)** of mortar between tile and substrate after proper bedding:
      - a. Periodically remove sheets or individual tiles to assure proper bond coverage consistent with industry specifications.
      - b. If coverage is found to be insufficient, use a larger size notch trowel.
  - G. Application Of Grout:
    1. Firmly set tile before applying grout:
      - a. This requires forty-eight (48) hours minimum.

2. Before grouting:
    - a. Remove all paper and glue from face of mounted tile.
    - b. Remove spacers or ropes before applying grouting:
  3. Mixing Grout:
    - a. Use clean buckets and mixing tools:
      - 1) Use sufficient pressure and flow grout in progressively to avoid air pockets and voids.
    - b. Machine mixing of grout is preferred to assure uniform blend. To prevent trapping air bubbles into prepared grout, use slow speed mixer.
    - c. Slake for fifteen (15) minutes.
    - d. Water or latex additives used for mixing with dry grout shall be measured accurately.
  4. Before grouting entire area, do a test area to assure there will be no permanent staining or discoloration of tile and to verify that excess grout can be easily removed from tile surface:
    - a. If necessary, pre-coat exposed surfaces of tile with a grout release recommended by Grout Manufacturer to facilitate removal of excess grout.
  5. Installing Grout:
    - a. Use caution, when grouting glazed ceramic tiles to prevent scratching or damaging surface of tile.
    - b. Dampen dry joints prior to grouting with sand-portland cement grout, standard sanded cement grout, standard unsanded cement grout, polymer modified sanded tile grout, and polymer modified unsanded tile grout. Do not leave puddles of water in joints before grouting.
    - c. Keep an adequate joint depth open for grouting. Force maximum amount of grout into joints.
    - d. Apply grout to produce full, smooth grout joints of uniform width, and free of voids and gaps
      - 1) Fill joints of cushion edge tile to depth of cushion.
      - 2) Fill joints of square edge tile flush with surface.
      - 3) Fill joint between wall tile and bull-nosed paver tile base with floor grout.
    - e. Install floor tile with grout thickness of **3/16 inch (4.76 mm)** maximum.
    - f. Remove excess grout from surface of tile before it loses its plasticity or begins to set.
    - g. Finished grout shall be uniform in color, smooth, and without voids, pin holes, or low spots.
- H. Curing:
1. Keep installation at **65 to 85 deg F (18 to 30 deg C)** during first eight (8) hours of cure. Shade area completely from sun during this period.
- I. Application of Joint Sealants:
1. Apply joint sealants after grout has cured:
    - a. This requires forty-eight (48) hours minimum.
  2. Before applying sealant:
    - a. Remove spacers or ropes before applying joint sealants.
    - b. Apply backer rod and joint sealants at expansion joints.

### 3.5 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
1. Correct any work found cracked, chipped, broken, unbounded and otherwise defective or not complying with contract document requirements at no additional cost to the Owner.

### 3.6 CLEANING

- A. If one has been used, remove grout release and clean tile surfaces so they are free of grout residue and foreign matter:
1. If a grout haze or residue remains, use a suitable grout haze remover or cleaner.
  2. Flush surface with clean water before and after cleaning.

### 3.7 PROTECTION

- A. Close to traffic areas where tile is being set and other tile work being done:
  - 1. Keep closed until tile is firmly set.
  - 2. Before, during, and after grouting, keep area clean, dry, and free from foreign materials and airflow that will interfere with setting and curing of grout.
- B. Newly tiled floors shall not be walked on nor worked on without using kneeling boards or equivalent protection of tiled surface.
- C. After cleaning, provide protective covering and maintain conditions protecting tile work from damage and deterioration:
  - 1. Where tiled surfaces will be subject to equipment or wheel traffic or heavy construction traffic, cover protective covering with **1/4 inch (6 mm)** hardboard, plywood, or similar material.

**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. Sections under 09 9000 heading 'Paints and Coatings'.
    - a. Pre-Installation conferences held jointly with Section 09 9001.

**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.

### 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) gallon of each finish coat, primer, and 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.

## 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 products of same manufacturer for each coat in coating system.
- 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. Acceptable Applicators. See Section 01 4301:
  - 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. 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. Finish casework and wood trims that are specified to be installed under Section 06 2001 and that are not called out to be factory-or shop-finished. Back prime wood elements to be installed against concrete or masonry or that may be subjected to moisture.
- 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. Category Four Colors. See Section 01 6200 for definitions of Categories:
  - 1. Interior:
    - a. Interior Walls, Ceilings, and Door Frames: Match existing color and gloss level.

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**SECTION 09 9122****INTERIOR PAINTED BRICK****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Preparing and painting existing interior brick surfaces listed below as described in 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. Manufacturer:
  - 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. Rest Rooms:
    - a. New Surfaces: Use MPI(a) INT 4.2F Waterborne Epoxy Finish system.
    - b. Previously Finished Surfaces: Use MPI(r) RIN 4.2E Waterborne Epoxy Finish system.
  - 2. All Other:
    - a. New Surfaces: Use MPI(a) INT 4.2D Latex Finish system.
    - b. Previously Finished Surfaces: Use MPI(r) REX 4.2H 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. Primer: Bonding primer as recommended by paint manufacturer to bond to the existing sealed brick.
  - 2. Finish Coats: MPI Product 141: 'Latex, Interior, High Performance Architectural, Semi-Gloss (MPI Gloss Level 5)'.

**PART 3 - EXECUTION****3.1 APPLICATION**

- A. General: See appropriate paragraphs of Section 09 9001.
- B. Existing Painted Surfaces:
  - 1. Remove deteriorated existing paint by scraping or sanding. Wash surfaces that have been defaced with marking pens, crayons, lipstick, etc, with solvent recommended by Paint Manufacturer. Spot prime such surfaces.
  - 2. Sand areas of existing sealed brick if necessary for bonding of new paint system. Clean existing painted surfaces, sanded or not, with mild soap and water, or with tri-sodium phosphate (TSP).
  - 3. Fill large holes with patching and small holes and cracks with spackle.
  - 4. Apply one coat primer to scraped and sanded areas.
  - 5. Apply one finish coat. Completely cover voids in masonry block but do not fill.

**END OF SECTION**



**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.
- 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.
  - 2. 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. Rest Rooms:
    - a. New Surfaces: Use MPI(a) INT 9.2F Waterborne Epoxy Finish system.
    - b. Previously Finished Surfaces: Use MPI(r) RIN 9.2E Waterborne Epoxy Finish system.
  - 2. 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) Rest Rooms: Gloss Level 6.
  - 2) Remaining Painted Surfaces: Gloss Level 5.
- D. Materials:
  - 1. Primers:
    - a. MPI Product 50, 'Primer Sealer, Latex, Interior'.
  - 2. Finish Coats:
    - a. Rest Rooms:
      - 1) Buildings with only Gypsum Board surfaces in rooms:
        - a) MPI Product 115, 'Epoxy-Modified Latex, Interior, Gloss (MPI Gloss Level 6)'.
      - 2) Buildings with Brick and Gypsum Board surfaces in same rooms:
        - a) MPI Product 77, 'Epoxy, Gloss'.
    - b. Remaining Painted Surfaces:
      - 1) MPI Product 141, 'Latex, Interior, High Performance Architectural, Semi-Gloss (MPI Gloss Level 5)'.

## **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 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.

**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.

**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. Location:
  1. Walls:
    - a. Light Orange Peel Texture:
      - 1) Match existing walls.
  2. Ceilings:
    - a. Light Skip Trowel Texture:
      - 1) Match existing ceilings.
- 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.

**END OF SECTION**

## **DIVISION 10: SPECIALTIES**

### **10 2000 INTERIOR SPECIALTIES**

10 2113 METAL TOILET COMPARTMENTS  
10 2813 COMMERCIAL TOILET ACCESSORIES  
10 2814 BABY-CHANGING STATION

END OF TABLE OF CONTENTS

**SECTION 10 2113****METAL TOILET COMPARTMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install metal toilet compartments as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for blocking in wood framing for compartment installation, ceiling support for urinal partitions, and door bumper.
  - 2. Section 09 2216: 'Non-Structural Metal Framing' for blocking in non-load-bearing metal framing for compartment installation and door bumper.
  - 3. Section 10 2813: 'Commercial Toilet Accessories'.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Stainless Steel: Stainless steels are alloys of iron to which at least 10 percent chromium has been added to increase corrosion resistance and will not rust when exposed to weather. To obtain greater corrosion resistance, more nickel and chromium are added to the alloy. Along with iron and chromium, all stainless steels contain some carbon to make it stronger.
    - a. Stainless Steel Alloys:
      - 1) Type 304 (UNS S30400): Austenitic stainless steel with non-magnetic properties in annealed condition that provide good corrosion resistance to both chemical and atmospheric exposures, with high resistance to oxidations. Most common and widely used stainless steel.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A167-99(2009), 'Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.'
    - b. ASTM A484/A484M-12, 'Standard Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings'.

**1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Color selection.
- B. 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) Manufacturer's literature or cut sheet.
        - b) Color selection.

## 1.4 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 and handle in compliance with Manufacturer's instructions and recommendations.

## 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's standard warranty.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Type One Acceptable Manufacturers:
  - 1. Flush-Metal Partition Corp, Maspeth, NY [www.flushmetal.com](http://www.flushmetal.com).
  - 2. Hadrian Inc, Mentor, OH [www.hadrian-inc.com](http://www.hadrian-inc.com).
  - 3. Equal as Approved by Architect before bidding. See Section 01 6200.

### 2.2 MANUFACTURED UNITS

- A. Toilet And Miscellaneous Partitions:
  - 1. Floor-mounted, overhead-braced.
  - 2. Panels:
    - a. Galvanized bonderized steel sheets (minimum **0.00015 inch (0.004 mm)** zinc coating).
    - b. Edges bound interlocked with drawn molding welded on corners.
    - c. Corners welded and ground smooth.
    - d. Sound deadening honeycomb core.
    - e. Provide wood blocking on all panels that have grab bars.
    - f. Gauge:
      - 1) Doors: **22 ga (0.08 mm)** minimum.
      - 2) Panels: **22 ga (0.08 mm)** minimum.
      - 3) Pilasters: **22 ga (0.08 mm)** minimum.
      - 4) Screens: **22 ga (0.08 mm)** minimum.
  - 3. Doors:
    - a. 34 inches wide and 28 inches wide as shown on Contract Drawings.
  - 4. Posts:
    - a. **20 ga (one mm)** minimum of same construction and finish as panels.
  - 5. Headrails:
    - a. Aluminum.
    - b. **20 ga (one mm)** minimum of same construction and finish as panels.
    - c. Anti-grip design.
  - 6. Plinths:
    - a. **20 ga (one mm)** Type 304 stainless steel, Number 4 finish.
    - b. **3 inch (76 mm)** minimum high, secured with concealed clips.
    - c. All fasteners used to attach Plinths, Posts and Pilasters to the floor shall be Type 304 stainless steel.
  - 7. Anchorages and fasteners:
    - a. Concealed: Non-corrosive, protective finish.
    - b. Tamper resistant Torx Head with pin screws.
  - 8. Hardware:
    - a. Each door:

- 1) Gravity type hinges with double handed, nylon bottom cam, adjustable for partial door closing position, bottom hinge finished flush with door bottom.
  - 2) Sliding or concealed door bolt with emergency access.
  - 3) Door strike and keeper with rubber bumper.
  - 4) Do not install coat hooks on door on in stall.
  - 5) Door pull on both sides of every door. Door pulls on opposite sides of doors shall share the same holes and screws in door (the interior door pull has countersunk screw holes).
- b. Finish: Chrome plated.
  - c. Meet requirements of ASTM B86, Alloy AG 40A.
- B. Urinal Partition:
1. Basic construction same as panels above, floor and ceiling mounted.
  2. Width to be **16 inches (400 mm)** minimum.
    - a. Partition maximum width shall not encroach into required accessibility clear floor space.

## 2.3 FINISHES

- A. Finish And Color:
1. Powder-coated paint finish.
  2. Class One Color Quality Standards. See Section 01 6200.
    - a. Flush-Metal: 63 Off White
    - b. Hadrian: 504 Linen

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
1. Field verify dimensions.
  2. Verify that necessary blocking has been installed in framed walls for partition installation and for place where coat hook / door bumper will strike wall.

### 3.2 INSTALLATION

- A. Install pilasters rigid, plumb, and level. Maintain proper door openings. Anchor pilaster to floor with Type 304 stainless steel fasteners embedded **2 inches (50 mm)** into concrete slab below setting bed.
- B. Secure panels to walls with two stirrup brackets minimum attached near top and bottom of each panel. Use fasteners of length to provide **one inch (25 mm)** embedment into blocking or masonry.
- C. Secure overhead brace to face sheets with two fasteners minimum per face. Set door tops parallel with brace. Set door bottom **12 inches (300 mm)** above floor.
- D. Plinth to be level with and snug to floor.

### 3.3 FIELD QUALITY CONTROL

- A. 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. Replace damaged or severely scratched materials with new materials at no additional cost to the Owner.



### **3.4 ADJUSTING**

- A. Lubricate hardware as recommended by Manufacturer.
- B. Set hinges on out-swinging doors to return to nearly closed position.
- C. Perform final adjustments to pilaster leveling devices, door hardware, and other operating parts of partition assembly just before Substantial Completion.

### **3.5 CLEANING**

- A. Remove protective masking. Clean exposed surfaces of partitions, hardware, fittings, and accessories.
- B. Touch-up minor scratches and other finish imperfections using materials and methods recommended by Manufacturer.

**END OF SECTION**

**SECTION 10 2813****COMMERCIAL TOILET ACCESSORIES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Is Not Limited To:
  - 1. Selected accessories for Rest Rooms:
    - a. Grab Bars.
    - b. Mirrors.
    - c. Sanitary Napkin Disposal Container.
    - d. Shelf.
    - e. Single Robe Hook.
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for blocking.
  - 2. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.
- C. Products Furnished But Not Installed Under This Section:
  - 1. Selected accessories for Rest Rooms:
    - a. Automatic touchless towel dispensers.
    - b. Soap dispensers.
    - c. Toilet tissue dispensers.
- D. Related Requirements:
  - 1. Section 01 1200: 'Multiple Contract Summary' soap dispensers, paper towel dispensers, and toilet tissue dispensers furnished and installed by Owner (FM Group).

**1.2 REFERENCES**

- A. Association Publications:
  - 1. United States Access Board:
    - a. Americans with Disabilities Act (ADA):
      - 1) ADA Standards:
        - a) ADA Accessibility Guidelines (ADAAG) (2004 or latest version).
- B. Definitions:
  - 1. Stainless Steel: Stainless steels are alloys of iron to which at least 10 percent chromium has been added to increase corrosion resistance and will not rust when exposed to weather. To obtain greater corrosion resistance, more nickel and chromium are added to the alloy. Along with iron and chromium, all stainless steels contain some carbon to make it stronger.
    - a. Austenitic Stainless Steel: Most popular of the stainless steels because of their ductility, ease of working and good corrosion resistance. Widely known as the 300 series.
  - 2. Stainless Steel Alloys:
    - a. Type 304 (UNS S30400): Austenitic stainless steel with non-magnetic properties in annealed condition that provide good corrosion resistance to both chemical and atmospheric exposures, with high resistance to oxidations. Most common and widely used stainless steel.
- C. Reference Standards:
  - 1. ASTM International:
    - a. A153/A153M-09, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.

- b. ASTM A653/A653M-13, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
  - c. ASTM A666-15, 'Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar'.
  - d. ASTM C1036-11, 'Standard Specification for Flat Glass'.
  - e. ASTM F446-85(2009), 'Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area'.
2. International Code Council / American National Standards Institute:
    - a. ICC/ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.
  3. International Standard Organization:
    - a. ISO 25537:2008, 'Glass in Building - Silvered Flat Glass Mirror'.

### 1.3 SUBMITTALS

- A. Action Submittals:
  1. Product Data:
    - a. Manufacturer's product data sheets indicating operating characteristics, materials and finishes.
    - b. Mounting requirements and rough-in dimensions.
  2. Shop Drawings:
    - a. Schedule showing items used, location where installed, and proper attaching devices for substrate.
- B. Informational Submittals:
  1. Manufacturers' Instructions:
    - a. Provide operation, care and cleaning instructions.
- 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 for each product.
    - b. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature or cut sheets.

### 1.4 QUALITY ASSURANCE

- A. Source Limitations:
  1. For products listed together in same Part 2 articles, obtain products from single source from single manufacturer.

### 1.5 WARRANTY

- A. Manufacturer Warranty:
  1. Manufacturer's standard warranty.
- B. Special Mirror Warranty:
  1. Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage or frame corrosion defects within specified warranty period:
    - a. Warranty Period: fifteen (15) years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 OWNER FINISHED PRODUCTS

- A. Furnished and Installed by Owner:
  - 1. Automatic Touchless Towel Dispensers:
    - a. Mount Towel Dispenser in 'Recessed Waste Receptacle Cabinet'.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories: Georgia-Pacific enMotion model no. 59460:
      - 1) Size: 14.8 inches (376 mm) wide x 9.75 inches (248 mm) deep x 16.75 inches (425 mm) high.
      - 2) Power source: battery.
      - 3) Color: splash blue.
  - 2. Soap dispensers.
  - 3. Toilet tissue dispensers.

### 2.2 MANUFACTURED UNITS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. AJW Architectural Products, A&J Washroom Accessories, Inc., New Windsor, NY [www.ajwashroom.com](http://www.ajwashroom.com).
    - b. American Specialties Inc (ASI), Yonkers, NY [www.americanspecialties.com](http://www.americanspecialties.com).
    - c. Bobrick Washroom Equipment Inc, North Hollywood, CA [www.bobrick.com](http://www.bobrick.com) or Bobrick Washroom Equipment of Canada Ltd, Scarborough, ON (416) 298-1611.
    - d. Bradley Corp, Menomonee Falls, WI [www.bradleycorp.com](http://www.bradleycorp.com).
    - e. General Accessory Manufacturing Co (GAMCO), Durant, OK [www.gamcousa.com](http://www.gamcousa.com).
- B. Materials:
  - 1. Design Criteria:
    - a. Stainless Steel: ASTM A666 Type 304 (18-8); satin finish exposed surfaces unless otherwise indicated.
    - b. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
    - c. Fasteners:
      - 1) Exposed: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant.
      - 2) Concealed: Galvanized Steel.
  - 2. Rest Rooms:
    - a. Mirrors:
      - 1) Channel-Frame Mirror:
        - a) Frame: Type 304 or Type 430, 20 gauge stainless steel channel frame.
        - b) Roll-formed one piece construction.
        - c) Exposed surfaces have #4 satin finish.
        - d) Edges and corners are burr free.
        - e) Glass: 1/4 inch (6.4 mm) silver coated and hermetically sealed. Guaranteed for 15 years against silver spoilage. Mirrors meet ASTM C1036 requirements.
        - f) Concealed surface mounted wall hanger.
      - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) AJW Architectural Products: Model U711.
        - b) American Specialties (ASI): Model 0620.
        - c) Bobrick: Model B-165.
        - d) Bradley: Model 781.
        - e) General Accessory (GAMCO): Model C Series.
    - b. Sanitary Napkin Disposal Container:
      - 1) Design Criteria:

- a) Surface mounted type 304, 22 gauge stainless steel with #4 satin finish. Seamless construction with radius and hemmed edges.
- b) Stainless steel piano hinge.
- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a) AJW Architectural Products: Model U590.
  - b) American Specialties (ASI): Model 0852.
  - c) Bobrick: Model B-270.
  - d) Bradley: Model 4781-15.
  - e) General Accessory (GAMCO): Model ND-1.
- c. Single Robe Hook:
  - 1) Surface mounted type 304, 22 gauge stainless steel with #4 satin finish.
  - 2) Concealed mounting bracket.
  - 3) Stainless steel locking setscrew on bottom.
  - 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) AJW Architectural Products: Model UX110SF.
    - b) American Specialties (ASI): Model 7340-S.
    - c) Bobrick: Model B6717.
    - d) Bradley: Model 9114.
    - e) General Accessory (GAMCO): Model 76717.
- d. Grab Bars:
  - 1) Configuration shown on Contract Drawings. Include center support for longer lengths when required:
  - 2) Design Criteria:
    - a) Comply with ADA guidelines and ADAAG accessible design for structural strength and local and state codes.
    - b) Concealed mount.
    - c) 18 ga (1.27 mm), type 304 stainless steel tubing.
    - d) 1-1/2 inch (38 mm) diameter.
    - e) Provide center support when required.
    - f) Snap-on flange covers.
    - g) Peened (non-slip) finish.
    - h) Sustain loads in excess of 900 lbs (408 kg).
  - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) AJW Architectural Products: Model UG3 Series.
    - b) American Specialties (ASI): Model 3800 Series.
    - c) Bobrick: Model B-6806 Series.
    - d) Bradley: Model 812 Series.
    - e) General Accessory (GAMCO): Model 150 Series.
- e. Shelf:
  - 1) Design Criteria:
    - a) 18 ga (1.27 mm), stainless steel with No. 4 Satin finish.
    - b) 6 inches (150 mm) wide.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) AJW Architectural Products: Model U776.
    - b) American Specialties (ASI): Model 0692.
    - c) Bobrick: Model B-296.
    - d) Bradley: Model 756.
    - e) General Accessory (GAMCO): Model S-6.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with ADA Accessibility Guidelines and installation heights as shown on Contract Drawings.
- B. Assemble fixtures and associated fittings and trim in accordance with manufacturer's instructions.

- C. Install using mounting devices proper for base structure.
- D. Install equipment level, plumb, and firmly in place in accordance with manufacturer's rough-in drawings.
- E. Where possible, mount like items in adjoining compartments back-to-back on same partition.
- F. Grab Bars:
  - 1. Install as per Manufacturers written installation instructions.
  - 2. Install grab bars to withstand downward force of not less than 250 lbf (1112 N) per ASTM F446.

### **3.2 REPAIR**

- A. Repair or replace defective work, including damaged equipment and components.
- B. Repair or replace malfunctioning equipment, or equipment with parts that bind or are misaligned.

### **3.3 CLEANING**

- A. Clean unit surfaces, and leave in ready-to-use condition.

### **3.4 ADJUSTING**

- A. Test each piece of equipment provided with moving parts to assure proper operation, freedom of movement, and alignment. Install new batteries in battery-powered items.

### **3.5 CLOSEOUT ACTIVITIES**

- A. Turn over keys, tools, maintenance instructions, and maintenance stock to Owner.

**END OF SECTION**

**SECTION 10 2814****BABY-CHANGING STATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But Is Not Limited To:
  - 1. Coordination and sequencing of Owner-Furnished baby-changing station as described in Contract Documents.
- B. Products Installed But Not Supplied Under This Section:
  - 1. Baby-changing station.
- C. Related Sections:
  - 1. Section 01 6400: 'Owner-Furnished Products', Owner will furnish baby-changing station. PART 2 PRODUCTS of this Section establishes quality of materials for information of Contractor, Architect, and Owner's representatives.
  - 2. Section 06 1100: 'Wood Framing' for blocking in wood stud framed walls for baby-changing stations.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. American National Standards Institute:
    - a. ANSI Z535.4-2011. 'Product Safety Signs and Labels'.
  - 2. ASTM International:
    - a. ASTM G21-13, 'Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi'.
    - b. ASTM F2285-04(2010), 'Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use'.
  - 3. International Code Council / American National Standards Institute:
    - a. ICC/ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the efforts of various trades affected by Work of this Section.
  - 2. Coordinate completions of solid blocking in walls.
- B. Sequencing:
  - 1. Install baby-changing stations after following has been completed:
    - a. Adjacent walls and ceilings are finished and painted.

**1.4 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Provide product literature or cut sheet on baby-changing station.
- B. Informational Submittals:
  - 1. Certificates:
    - a. Manufacturer to provide \$10,000,000 minimum 'Certificate of Liability Insurance' policy.

- 1) Policy on file at Church Headquarters. For questions, notify Mark Douglass at [markdouglass@ldschurch.org](mailto:markdouglass@ldschurch.org).
2. Manufacturer Instructions:
  - a. Printed installation instructions.
- C. Closeout Submittals:
  1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Include copy of final, executed warranty for defects in material and workmanship.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's literature or cut sheets.

## 1.5 WARRANTY

- A. Manufacturer Warranty:
  1. Manufacturer's standard warranty for baby-changing station to be free from defects in material and workmanship under normal use and service, with proper maintenance, for five (5) years.

## PART 2 - PRODUCTS

### 2.1 OWNER-FURNISHED PRODUCTS

- A. Category Two National Contract Manufacturers. See Section 01 6200 for definition of Categories.
  1. Koala, Denver, CO [www.koalabear.com](http://www.koalabear.com).
- B. Baby Changing Station:
  1. Description:
    - a. Molded high impact polyethylene with integral straps for securing baby.
  2. Design Criteria:
    - a. Manufacture to provide 'Certificate of Liability Insurance' policy.
    - b. Surface mounted.
    - c. Child protection straps.
    - d. Antimicrobial bed surface
    - e. Support **200 lbs (90 kg)** with minimal deflection.
    - f. Meet ADA regulations of ICC/ANSI A117.1 when properly installed.
    - g. Conform to ANSI Z535.4 for safety signs and labels, ASTM G21 for antifungal standards, and ASTM F2285 for consumer safety performance standard.
  3. Approved Products. See Section 01 6200 for definition of Categories:
    - a. Horizontal: Koala Kare model number KB200 by Koala.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  1. Verify that solid blocking has been installed in wall framing where changing station is to be installed.
  2. Do not install unit by any other means other than screws or lag bolts into solid blocking.



### 3.2 INSTALLATION

- A. Install items in accordance with Manufacturer's submitted, written instructions for screws or lag bolts into solid substrate capable of supporting 200 lbs (90 kg). Install using mounting devices proper for base structure.

**END OF SECTION**

# **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 0553 IDENTIFICATION FOR PLUMBING PIPES AND EQUIPMENT
- 22 0719 PLUMBING PIPING INSULATION

## **22 1000 PLUMBING PIPES AND PUMPS**

- 22 1116 DOMESTIC WATER PIPING
- 22 1313 FACILITY SEWERS
- 22 1319 FACILITY SANITARY SEWER SPECIALTIES

## **22 4000 PLUMBING FIXTURES**

- 22 4213 COMMERCIAL WATER CLOSETS AND URINALS
- 22 4216 COMMERCIAL LAVATORIES AND SINKS

END OF TABLE OF CONTENTS

**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: Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
  - 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. Division 33: 'Utilities' for piped utilities.
  - 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.
- 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) 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 Building Codes and 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.
  - 2. Use domestic made pipe and pipe fittings on Project, except non-domestic made cast iron pipe and fittings by MATCO-NORCA 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**

**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 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
  - 2. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.
  - 3. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.
  - 4. Section 23 0529: 'Hangers And Supports For HVAC Piping And Equipment' for gas piping used with HVAC equipment.
  - 5. 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	Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller	10 mm	50 mm and smaller
1/2 inch	2-1/2 to 3-1/2 inches	13 mm	64 mm to 88 mm

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

Rods		Number of Pipes per Hanger for Each Pipe Size						
Number	Diameter	50mm	64mm	75mm	100mm	125mm	150mm	200mm
2	10 mm	Two	0	0	0	0	0	0
2	13 mm	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) Support PEX pipe at 32 inches (800 mm) minimum on center.
- 4) 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**

**SECTION 22 0553****IDENTIFICATION FOR PLUMBING PIPES AND EQUIPMENT****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install identification of plumbing piping and equipment as described in Contract Documents.

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

- A. Materials:
1. Labels and Valve Tags:
    - a. Equipment and Valve Identification:
      - 1) Black formica, with white reveal when engraved.
      - 2) Lettering to be **3/16 inch (5 mm)** high minimum.
  2. Paint:
    - a. One Coat Primer:
      - 1) 6-2 Quick Drying Latex Primer Sealer over fabric covers.
      - 2) 6-205 Metal Primer under dark color paint.
      - 3) 6-6 Metal Primer under light color paint.
    - b. Finish Coats: Two coats 53 Line Acrylic Enamel.
    - c. Performance Standard: Paints specified are from Pittsburgh Paint & Glass (PPG), Pittsburgh, PA [www.pittsburghpaints.com](http://www.pittsburghpaints.com) or PPG Canada Inc, Mississauga, ON (800) 263-4350 or (905) 238-6441.
    - d. Type Two Acceptable Products. See Section 01 6200.
      - 1) Paint of equal quality from following Manufacturers may be submitted for Architect's approval before use. Maintain specified colors, shades, and contrasts.
        - a) Benjamin Moore, Montvale, NJ [www.benjaminmoore.com](http://www.benjaminmoore.com) or Toronto, ON (800) 304-0304 or (416) 766-1176.
        - b) ICI Dulux, Cleveland, OH or ICI Paints Canada Inc, Concord, ON [www.dulux.com](http://www.dulux.com).
        - c) Sherwin Williams, Cleveland, OH [www.sherwin-williams.com](http://www.sherwin-williams.com).
  3. Pipe Markers:
    - a. Rigid vinyl or polyester, 360 degree wrap-around pipe markers.
    - b. Surface printed with UV ink and then thermoformed. Legend to include pipe contents and directional arrows.

**PART 3 - EXECUTION****3.1 APPLICATION**

- A. Labels:
1. Identify following items with specified labels fastened to equipment with screws (unless noted otherwise):
    - a. Water Heaters.
  2. Engrave following data from Equipment Schedules on Drawings onto labels:
    - a. Equipment mark.

- b. Room(s) served.
  - c. Panel and breaker from which unit is powered.
- B. Painting:
- 1. Only painted legends, directional arrows, and color bands are acceptable.
  - 2. 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 (7.6 m) on long continuous lines.
    - e. Stenciled symbols shall be one inch high and black.
- C. Pipe Markers:
- 1. Wrap pipe marker around pipe with 1/2 inch minimum overlap. Use adhesive strip at overlap to adhere ends of marker together.
  - 2. Locate markers as follows:
    - a. Adjacent to each item of equipment.
    - b. At points of entry and exit where piping goes through wall.
    - c. On each riser and junction.
    - d. Every 25 feet maximum on long, continuous runs.
- D. Valve Tags:
- 1. Identify domestic water shut-off valves with specified valve tag fastened to valve body with removable chain.
  - 2. Engrave following data onto valve tags:
    - a. Area served.
    - b. Fixtures Served.

### 3.2 ATTACHMENTS

- A. Schedules:
- 1. Pipe Identification Schedule:
    - a. Apply stenciled symbols as follows:

Pipe Use	Abbreviation
Domestic Cold Water	CW
Domestic Hot Water	HW

**END OF SECTION**

**SECTION 22 0719****PLUMBING PIPING INSULATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install insulation on hot and cold water lines, fittings, valves, and accessories as described in Contract Documents.
- B. Related Requirements:
1. Section 22 1116: 'Domestic Water Piping'.

**PART 2 - PRODUCTS****2.1 COMPONENTS**

- A. Manufacturers:
1. Manufacturer Contact List:
    - a. Armacell, Mebane, NC [www.armaflex.com](http://www.armaflex.com).
    - b. Childers Products Co, Eastlake, OH [www.fosterproducts.com](http://www.fosterproducts.com).
    - c. IMCOA, Youngsville, NC [www.nomacokflex.com](http://www.nomacokflex.com).
    - d. Johns-Manville, Denver, CO [www.jm.com](http://www.jm.com).
    - e. Knauf, Shelbyville, IN [www.knauffiberglass.com](http://www.knauffiberglass.com).
    - f. Manson, Brossard, PQ, Canada [www.isolationmanson.com](http://www.isolationmanson.com).
    - g. Nomaco Inc, Yopungsville, NC [www.nomacokflex.com](http://www.nomacokflex.com).
    - h. Owens-Corning, Toledo, OH [www.owenscorning.com](http://www.owenscorning.com).
    - i. Speedline Corp, Solon, OH [www.speedlinepvc.com](http://www.speedlinepvc.com).
- B. Materials:
1. Above Grade Metal Piping:
    - a. Insulation For Piping:
      - 1) Snap-on glass fiber or melamine foam pipe insulation, or heavy density pipe insulation with factory vapor jacket.
      - 2) Insulation Thickness:
 

Service Water Temperature	Pipe Sizes		
	Up to 1-1/4 In	1-1/2 to 2 In	Over 2 In
45 - 130 Deg F	1/2 In	1/2 In	One In
      - 3) Performance Standards: Fiberglas ASJ by Owens-Corning.
      - 4) Type One Acceptable Manufacturers:
        - a) Childers Products.
        - b) Knauf.
        - c) Manson.
        - d) Owens-Corning.
        - e) Johns-Manville.
        - f) Equal as approved by Architect before bidding. See Section 01 6200.
    - b. Fitting, Valve, And Accessory Covers:
      - 1) PVC.
      - 2) Performance Standard: Zeston by Johns-Manville.
      - 3) Type One Acceptable Manufacturers:
        - a) Knauf.
        - b) Speedline.

- c) Johns-Manville.
- d) Equal as approved by Architect before bidding. See Section 01 6200.
- 2. Below Grade Metal Piping:
  - a. Insulation:
    - 1) 1/2 inchthick.
    - 2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) SS Tubolit by Armacell.
      - b) ImcoLock by Imcoa.
      - c) Nomalock or Therma-Cel by Nomaco.
  - b. Joint Sealant:
    - 1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) Armacell 520.
      - b) Nomaco K-Flex R-373.
- 3. Pex Piping, Above And Below Grade:
  - a. Insulation:
    - 1) 1/2 inchthick.
    - 2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) SS Tubolit by Armacell.
      - b) ImcoLock by Imcoa.
      - c) Nomalock or Therma-Cel by Nomaco.
  - b. Joint Sealant:
    - 1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) Armacell 520.
      - b) Nomaco K-Flex R-373.
      - c)
- 4. PP-R Piping, Above And Below Grade:
  - a. Insulation:
    - 1) 1/2 inchthick.
    - 2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) SS Tubolit by Armacell.
      - b) ImcoLock by Imcoa.
      - c) Nomalock or Therma-Cel by Nomaco.
  - b. Joint Sealant:
    - 1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) Armacell 520.
      - b) Nomaco K-Flex R-373.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Above Grade Piping:
  - 1. Apply insulation to clean, dry piping with joints tightly butted.
  - 2. Install insulation in manner to facilitate removal for repairs. Place sections or blocks so least possible damage to insulation will result from inspection or repairs of piping or equipment.
  - 3. Adhere 'factory applied vapor barrier jacket lap' smoothly and securely at longitudinal laps with white vapor barrier adhesive. Adhere 3 inch wide self-sealing butt joint strips over end joints.
  - 4. Fittings, Valves, And Accessories:
    - a. Insulate with same type and thickness of insulation as pipe, with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
    - b. Cover insulation with one piece fitting cover secured by stapling or taping ends to adjacent pipe covering.
      - 1) Alternate Method: Insulate fittings, valves, and accessories with one inch of insulating cement and vapor seal with two 1/8 inch wet coats of vapor barrier mastic reinforced with glass fabric extending 2 inches onto adjacent insulation.
  - 5. Pipe Hangers:
    - a. Do not allow pipes to come in contact with hangers.
    - b. Pipe Shield:



- 1) Provide schedule 40 PVC by 6 inch (150 mm) long at each clevis and/or unistrut type hanger.
- 2) Provide 16 ga by 6 inch long galvanized shields at each pipe hanger to protect pipe insulation from crushing by clevis hanger.
- 3) Provide 22 ga by 6 inch long galvanized shield at each pipe hanger to protect insulation from crushing by Unistrut type hanger.

B. Below Grade Piping:

1. Slip underground pipe insulation onto pipe and seal butt joints.
2. Where slip-on technique is not possible, slit insulation, apply to pipe, and seal seams and joints.

**END OF SECTION**

**SECTION 22 1116****DOMESTIC WATER PIPING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Perform excavating and backfilling required by work of this Section.
  1. Furnish and install potable water piping and connect to existing lines complete with necessary valves, connections, and accessories inside building as described in Contract Documents.
- B. Related Requirements:
1. Section 03 3111: 'Cast-In-Place Structural Concrete'.
  2. Section 22 0501: 'Common Piping Requirements'.
  3. Section 22 0719: 'Plumbing Piping Insulation'.
  4. Section 31 2316: 'Excavation' for criteria for performance of excavation.
  5. Section 31 2323: 'Fill' for criteria for performance of backfill.

**1.2 REFERENCES**

- A. Reference Standards:
1. American National Standards Institute / American Society of Sanitary Engineers:
    - a. ANSI/ASSE 1003-2009, 'Water Pressure Reducing Valves for Domestic Water Distribution Systems'.
    - b. ANSI/ASSE 1017-2009, 'Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems'.
    - c. ANSI/ASSE 1070-2015, 'Performance Requirements for Water Temperature Limiting Devices'.
  2. American Water Works Association:
    - a. AWWA C904-16, 'Cross-Linked Polyethylene (PEX) Pressure Pipe, 1/2 inch (12 mm) Through 3 inch (76 mm) for Water Service'.
  3. ASTM International:
    - a. ASTM B88-14, 'Standard Specification for Seamless Copper Water Tube'.
    - b. ASTM E84-15b, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
    - c. ASTM F876-15a, 'Standard Specification for Crosslinked Polyethylene (PEX) Tubing'.
    - d. ASTM F877-11a, 'Standard Specification for Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems'.
    - e. ASTM F1807-15, 'Standard Specification for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing'.
    - f. ASTM F2023-15, 'Standard Test Method for Evaluating the Oxidative Resistance of Crosslinked Polyethylene (PEX) Tubing and Systems to Hot Chlorinated Water'.
    - g. ASTM F2389-15, 'Standard Specification for Pressure-rated Polypropylene (PP) Piping Systems'.
  4. NSF International Standard:
    - a. NSF P171, 'Protocol for Chlorine Resistance of Plastic Piping Materials' (1999).
  5. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 14-2015, 'Plastic Piping System Components and Related Materials'.
    - b. NSF/ANSI 61-2015, 'Drinking Water System Components - Health Effects'.
    - c. NSF/ANSI 372-2016, 'Drinking Water System Components - Lead Content'.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Qualifications:
  - 1. Manufacturer Qualifications:
    - a. PP-R pipe:
      - 1) Certified by NSF International.
  - 2. Installers Qualifications:
    - a. PP-R pipe:
      - 1) Certified by Manufacturer.

### 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's Literature:
      - 1) PEX pipe and PEX pipe fittings.
      - 2) PP-R pipe and PP-R pipe fittings.
  - 2. Samples:
    - a. PEX pipe fitting.
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Written report of sterilization test.

### 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

## PART 2 - PRODUCTS

### 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Aquatherm, Inc., Lindon, UT [www.aquathermpipe.com](http://www.aquathermpipe.com).
    - b. Cash Acme, Cullman, AL [www.cashacme.com](http://www.cashacme.com)
    - c. Cla-Val Company, Costa Mesa, CA or Cla-Val Canada Ltd, Beamsville, ON [www.cla-val.com](http://www.cla-val.com).
    - d. Conbraco Industries Inc, Matthews, NC [www.conbraco.com](http://www.conbraco.com) or Conbraco (Honeywell Ltd), Scarborough, ON (416) 293-8111.
    - e. Hammond Valve, New Berlin, WI [www.hammondvalve.com](http://www.hammondvalve.com).
    - f. Handy & Harmon Products Div, Fairfield, CT [www.handyharmon.com](http://www.handyharmon.com) or Handy and Harmon of Canada Ltd, Rexdale, ON (800) 463-1465 or (416) 675-1860.
    - g. Harris Products Group, Cincinnati, OH [www.harrisproductsgroup.com](http://www.harrisproductsgroup.com).
    - h. Honeywell Inc, Minneapolis, MN [www.honeywell.com](http://www.honeywell.com).
    - i. Leonard Valve Co, Cranston, RI [www.leonardvalve.com](http://www.leonardvalve.com).
    - j. Milwaukee Valve Co, New Berlin, WI [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
    - k. Nibco Inc, Elkhart, IN [www.nibco.com](http://www.nibco.com).
    - l. Rehau, Leesburg, VA [www.rehau-na.com](http://www.rehau-na.com).
    - m. Sloan Valve Co, Franklin Park, IL [www.sloanvalve.com](http://www.sloanvalve.com).
    - n. Spence Engineering Co, Walden, NY [www.spenceengineering.com](http://www.spenceengineering.com).

- o. Symmons Industries, Braintree, MA [www.symmons.com](http://www.symmons.com).
  - p. Uponor Inc, Apple Valley, MN [www.uponor-usa.com](http://www.uponor-usa.com).
  - q. Viega ProPress, Wichita, KS [www.viega-na.com](http://www.viega-na.com).
  - r. Watts Regulator Co, Andover, MA [www.wattsreg.com](http://www.wattsreg.com).
  - s. Wilkins (Zurn Wilkins), Paso Robles, CA [www.zurn.com](http://www.zurn.com).
  - t. Zurn PEX, Inc., Commerce, TX [www.zurnpex.com](http://www.zurnpex.com).
- B. Materials:
1. Design Criteria:
    - a. All drinking water products, components, and materials above and below grade used in drinking water systems must meet NSF International Standards for Lead Free.
    - b. No CPVC allowed.
  2. Pipe:
    - a. Copper:
      - 1) Above-Grade:
        - a) Meet requirements of ASTM B88, Type L.
      - 2) Below-Grade:
        - a) Meet requirements of ASTM B88, Type K. 3/4 inch (19 mm) minimum under slabs.
        - b) 2 inches (50 mm) And Smaller: Annealed soft drawn.
        - c) 2-1/2 inches (64 mm) And Larger: Hard Drawn.
    - b. Cross-Linked Polyethylene (PEX):
      - 1) Certified with NSF International against NSF Standards NSF/ANSI 14, NSF/ANSI 61, NSF/ANSI 372, and NSF P171 Protocol.
      - 2) Copper tube size (CTS) outside dimensions and Standard Dimension Ratio (SDR) of 9.
      - 3) Pressure rated for 160 psi (1.10 MPa) at 73 deg F (22.8 deg C), 100 psi (0.69 MPa) at 180 deg F (82 deg C), and 80 psi (0.552 MPa) at 200 deg F (93 deg C).
      - 4) Marked with Manufacturer's name, design pressure and temperature ratings, and third party certification stamp for NSF-PW.
      - 5) Manufactured by Engel or peroxide method (PEX-A) or by silane method (PEX-B).
      - 6) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) `Raupex by Rehau.
        - b) Wirsbo Aquapex by Uponor.
        - c) ViegaPEX by Viega.
        - d) Zurn PEX by Zurn PEX.
    - c. Polypropylene-Random (PP-R):
      - 1) Above-Grade:
        - a) Meet requirements of ASTM F2389 and be certified by NSF International per ASTM F2389, NSF/ANSI 14, and NSF/ANSI 61.
        - b) SDR 7.4 Greenpipe faser for domestic hot water and SDR 7.4 or SDR 11 greenpipe for domestic cold water. Aquatherm Lilac SDR 11 purple piping for recycled/reclaimed water systems.
      - 2) Below-Grade:
        - a) Meet requirements of ASTM F2389 and be certified by NSF International per ASTM F2389, NSF/ANSI 14, and NSF/ANSI 61.
        - b) SDR 7.4 Greenpipe faser for domestic hot water and SDR 7.4 or SDR 11 greenpipe for domestic cold water. Aquatherm Lilac SDR 11 purple piping for recycled/reclaimed water systems.
      - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) Aquatherm Greenpipe, Greenpipe faser, and Lilac by Aquatherm.
  3. Fittings:
    - a. For Copper Pipe: Wrought copper.
    - b. For PEX Pipe:
      - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) Everloc by Rehau.
        - b) Viega PEX Press Zero Lead Fittings with attached stainless steel sleeves or Viega PEX Press Radel-R Polymer with attached stainless steel sleeves by Viega.
        - c) ProPEX fittings by Uponor including EP flow-through multiport tees.
        - d) Zurn PEX XL, DZR and CR fittings.
    - c. For PP-R Pipe:
      - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

- a) Greenpipe by Aquatherm.
- 4. Connections For Copper Pipe:
  - a. Above-Grade:
    - 1) Sweat copper type with 95/5 or 96/4 Tin-Antimony solder, Bridgit solder, or Silvabrite 100 solder. Use only lead-free solder.
    - 2) Viega ProPress System
  - b. Below Grade:
    - 1) Brazed using following type rods:
      - a) Copper to Copper Connections:
        - (1) AWS Classification BCuP-4 Copper Phosphorus (6 percent silver).
        - (2) AWS Classification BCuP-5 Copper Phosphorus (15 percent silver).
      - 2) Copper to Brass or Copper to Steel Connections: AWS Classification BAg-5 Silver (45 percent silver).
      - 3) Do not use rods containing Cadmium.
      - 4) Brazing Flux:
        - a) Approved Products:
          - (1) Stay-Silv white brazing flux by Harris Product Group.
          - (2) High quality silver solder flux by Handy & Harmon.
      - 5) Joints under slabs acceptable only if allowed by local codes.
- 5. Connections For PP-R Pipe:
  - a. Above-Grade:
    - 1) Socket-fusion, fusion-outlet, electrofusion, butt welding, and mechanical transition fittings including threaded adapters, groove adapters, and flanges.
  - b. Below-Grade:
    - 1) All joints shall be fusion-welded PP-R except that flanges may be used when connecting to other piping systems. Mechanical fittings shall not be used below grade.
    - 2) Joints under slabs acceptable only if allowed by local codes.
- 6. Ball Valves:
  - a. Use ball valves exclusively unless otherwise specified. Ball valves shall be by single manufacturer from approved list below.
  - b. Valves shall be two-piece, full port for 150 psi (1.03 MPa) SWP.
    - 1) Operate with flow in either direction, suitable for throttling and tight shut-off.
    - 2) Body: Bronze, 150 psig (1.03 MPa) wsp at 350 deg F (177 deg C) and 400 psig (2.76 MPa) wog.
    - 3) Seat: Bubble tight at 100 psig (0.69 MPa) under water.
  - c. Class One Quality Standard: Nibco T585 or S585.
    - 1) Equal by Conbraco 'Apollo,' Hammond, Milwaukee, or Watts.
  - d. PP-R piping if used:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) PP-R fusion-weld ball valves by Aquatherm.
- 7. Mixing Valve **MV-1**:
  - a. Solid brass construction and CSA B125 certified.
  - b. Includes integral check valves and inlet screen. Features advanced paraffin-based actuation technology.
  - c. Flow of 5.7 GPM (21.58 LPM) with maximum 10 psi (69 kPa) pressure drop. Perform to minimum flow of 0.5 GPM (1.89 LPM) in accordance with ASSE 1070.
  - d. Set for 110 deg F (43 deg C) Service.
  - e. Match Construction Drawings for connection sizes.
  - f. Class One Quality Standard: Powers LFLM495. See Section 01 6200.
  - g. Acceptable Manufacturers: Lawler, Leonard, Powers, Sloan, Symmons, and Watts.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Below Grade:
  - 1. Install piping under slabs without joints where possible.
  - 2. Insulate water piping buried within building perimeter.

3. Bury water piping 6 inches (150 mm) minimum below bottom of slab and encase in 2 inches (50 mm) minimum of sand.

- B. Locate cold water lines a minimum of 6 inches (150 mm) from hot water line.

### 3.2 FIELD QUALITY CONTROL

#### A. Field Tests:

1. Before pipes are covered, test systems in presence of Architect/Engineer at 125 psig (0.86 MPa) hydrostatic pressure for four (4) hours and show no leaks.
2. Disconnect equipment not suitable for 125 psig (0.86 MPa) pressure from piping system during test period.
3. PP-R Piping:
  - a. Test in accordance with Manufacturer's instructions prior to covering.
    - 1) Provide documentation.

### 3.3 CLEANING

- A. Sterilize potable water system with solution containing 200 parts per million minimum of available chlorine and maintaining pH of 7.5 minimum. Introduce chlorinating materials into system in manner approved by Architect/Engineer. Allow sterilization solution to remain for twenty four (24) hours and open and close valves and faucets several times during that time.
- B. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.
- C. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.

**END OF SECTION**

**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.
  - 2. Perform excavation and backfill required by work of this Section.
- B. Related Requirements:
  - 1. Sections Under 07 3000 Heading: Furnishing and installing of roof jacks and pipe flashing at roof.
  - 2. Section 07 8400: 'Firestopping' for quality of firestopping material.
  - 3. Section 22 0501: 'Common Plumbing Requirements'.
  - 4. Section 22 1319: 'Facility Sanitary Sewer Specialties' for furnishing of sewer specialties.
  - 5. Section 31 2316: 'Excavation' for criteria for performance of excavation.
  - 6. Section 31 2323: 'Fill' for criteria for performance of backfill and compaction.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conference: Participate in pre-installation conference specified in Section 03 3111.

**1.3 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 and choice. 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. Metal Buried Piping:
    - a. Approved Types: Service weight, single-hub or no-hub type cast iron soil pipe meeting requirements of ASTM A74.
    - b. Joint Material:
      - 1) Single-Hub: Rubber gaskets meeting requirements of ASTM C564.
      - 2) No-Hub:



- a) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - b) American Brass & Iron: SuperGrip 304.
  - c) Anaco-Husky: Husky SD 4000 coupling.
  - d) Clamp-All: Neoprene gaskets with type 304 stainless steel clamp and 24 ga type 304 stainless steel housing.
  - e) Mission Rubber: Heavy weight coupling.
  - f) MG Piping: MG Coupling.
  - g) Mifab: MI-XHUB – Heavy duty shielded coupling type 301 or 304 stainless steel.
4. Metal 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.
5. Metal 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.
6. Cleanouts for Metal 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 as specified in Sections 31 2316 and 31 2323 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**

**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 09 3013: 'Ceramic Tile' for floor drains in ceramic tile floors.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.
  - 3. 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. Sioux Chief Manufacturing Co, Peculiar, MO [www.siouxchief.com](http://www.siouxchief.com).
    - f. 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).
    - g. Wade Div Tyler Pipe, Tyler, TX [www.wadedrains.com](http://www.wadedrains.com).
    - h. Watts Drainage, Spindale, NC [www.watts.com](http://www.watts.com) or Watts Industries, Burlington, ON, Canada [www.wattscda.com](http://www.wattscda.com).
    - i. 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.
      - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) Josam: 30000-50-Z-5A.
        - b) J. R. Smith: 2010-A.
        - c) Mifab: F-1100-C.
        - d) Sioux Chief: 832.
        - e) Wade: 1100.
        - f) Watts: FD-200-A.
        - g) Zurn: Z-415.

- b. Floor Drain **FD-2**:
  - 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:
  - 1. Drain 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**

**SECTION 22 4213****COMMERCIAL WATER CLOSETS AND URINALS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install plumbing fixtures as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 07 9213: 'Elastomeric Joint Sealants' for sealants used between fixtures and other substrates.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.
  - 3. Section 22 1116: 'Domestic Water Piping'.

**1.2 REFERENCES**

- A. Definitions:
  - 1. High-Efficiency Toilet (HET): Toilets with effective flush volume of 1.28 gallons or less.
  - 2. Maximum Performance (MaP): Toilet testing that rates toilet efficiency and flush performance by measuring number of grams of solid waste (soybean paste and toilet paper) that a toilet can flush and remove completely from fixture in single flush represented as a scale or score. 1000 grams is highest score possible ([www.map-testing.com](http://www.map-testing.com)).
- B. Reference Standards:
  - 1. American Society of Mechanical Engineers / CSA Group (Canadian Standards Association):
    - a. ASME A112.19.2-2013/CSA B45.1-13, 'Ceramic Plumbing Fixtures'.

**1.3 SUBMITTALS**

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operation and Maintenance Data:
      - 1) Sensor Operated operation and maintenance manuals.

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. American Standard Brands, Piscataway, NJ [www.americanstandard-us.com](http://www.americanstandard-us.com) or American Standard Canada, Mississauga, ON [www.americanstandard.ca](http://www.americanstandard.ca).
    - b. Bemis Manufacturing Co, Sheboygan Falls, WI [www.bemismfg.com](http://www.bemismfg.com).
    - c. Beneke by Sanderson Plumbing Products, Columbus, MS [www.sppi.com](http://www.sppi.com).
    - d. Church Seat Co, Sheboygan Falls WI [www.churchseats.com](http://www.churchseats.com).
    - e. Dearborn Brass, Cleveland, OH [www.dearbornbrass.com](http://www.dearbornbrass.com).
    - f. Gerber Plumbing Fixtures LLC, Woodridge, IL [www.gerberonline.com](http://www.gerberonline.com).
    - g. Kohler Co Plumbing Div, Kohler, WI [www.us.kohler.com](http://www.us.kohler.com).
    - h. McGuire Manufacturing Co, Cheshire, CT [www.mcguiremfg.com](http://www.mcguiremfg.com).

- i. Olsonite Corp, Newnan, GA [www.olsonite.net](http://www.olsonite.net) or Olsonite Co Ltd, Tilbury, ON (519) 682-1240.
  - j. Toto U.S.A., Inc., Morrow, GA [www.totousa.com](http://www.totousa.com)
  - k. 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. Meet or exceed ASME A112.19.2/CSA B45.1 for Vitreous China Plumbing Fixtures.
    - b. Interior exposed pipe, valves, and fixture trim, including trim behind custom casework doors, shall be chrome plated.
    - c. All materials NOT required to be low lead compliant.
- C. Materials:
1. Water Closets:
    - a. Floor Mounted With Tank:
      - 1) Standard Fixture: **WC-1**
        - a) Water usage of 1.6 gallons per flush.
        - b) MaP Score of 1000 grams.
        - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
          - (1) American Standard: Cadet 3 Elongated 215CA.004.
          - (2) Gerber: Avalanche AV-21-812.
          - (3) Kohler: Wellworth K-3978.
          - (4) Sloan: WETS-9003-1.6.
          - (5) Toto: 'Drake' CST744S.
      - 2) Standard ADA Accessible Fixture: **WC-2**
        - a) Water usage of 1.6 gallons per flush.
        - b) 18 inch maximum rim height.
        - c) MaP Score of 1000 grams.
        - d) Provide right side flush control if required to meet ADA requirements.
        - e) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
          - (1) American Standard: Cadet 3 Right Height Elongated 215AA.004.
          - (2) Gerber: Avalanche AV-21-818.
          - (3) Kohler: Highline K-3979.
          - (4) Sloan: WETS-9023-1.6.
          - (5) Toto: 'ADA Drake' CST744SL.
    2. Water Closet Accessories:
      - a. Seats:
        - 1) Provide split front type with check hinge.
        - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
          - a) Standard And Handicap Accessible Fixtures:
            - (1) American Standard: 5905.100SS.
            - (2) Bemis: 1655SSC.
            - (3) Beneke: 527 SS.
            - (4) Church: 9500SSC.
            - (5) Kohler: K-4731-C.
            - (6) Olsonite: 95SSC.
            - (7) Toto SC534.
      - b. Supply Pipe And Stop:
        - 1) Provide chrome plated quarter-turn brass ball valve, 12 inch ( braided stainless steel riser, and chrome-plated steel flange.
        - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
          - a) McGuire: BV2166CC.
          - b) Zurn: Z8804.

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

- A. Install each fixture with separate vent line. Do not circuit vent.
- B. Ensure provisions are made for proper support of fixtures and that rough-in piping is accurately set and protected from movement and damage.
  - 1. Seal wall-mounted fixtures around edges to wall with sealant specified in Section 07 9213 'Elastomeric Joint Sealants'.
- C. Provide each individual fixture supply with accessible chrome-plated stop valve with hand wheel.
- D. Mounting:
  - 1. Water Closets:
    - a. ADA Accessible: Install with flush actuator located on wide side of stall.
- E. Water Closets:
  - 1. Floor or Wall Fixtures:
    - a. Make fixture connections with approved brand of cast iron flange, soldered or caulked securely to waste pipe. Make joints between fixtures and flanges tight with approved fixture setting compound or gaskets. Caulk between fixtures with sealant specified in Section 07 9213. Point edges.

**3.2 CLEANING**

- A. Polish chrome finish at completion of Project.

**END OF SECTION**



**SECTION 22 4216****COMMERCIAL LAVATORIES AND SINKS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install plumbing fixtures as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 07 9213: 'Elastomeric Joint Sealants' for sealants used between fixtures and other substrates.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.
  - 3. Section 22 1116: 'Domestic Water Piping'.

**1.2 REFERENCES**

- A. Reference Standard:
  - 1. American National Standards Institute / International Code Council:
    - a. ANSI/ICC A117.1-2009, 'Standard for Accessible and Usable Buildings and Facilities'.
  - 2. American Society of Mechanical Engineers / Canadian Standards Association (CSA Group):
    - a. ASME A112.18.1-2012/CSA B125.1-12, 'Plumbing Supply Fittings'.
  - 3. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 61-2015, 'Drinking Water System Components - Health Effects'.
    - b. NSF/ANSI 372-2016, 'Drinking Water System Components - Lead Content'.

**1.3 QUALITY ASSURANCE**

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

**1.4 SUBMITTALS**

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.

**1.5 WARRANTY**

- A. Manufacturer Warranty:
  - 1. Manufacturer's standard Warranty against material or Manufacturing defects.

## PART 2 - PRODUCTS

### 2.1 ASSEMBLIES

#### A. Manufacturers:

1. Manufacturer Contact List:
  - a. American Standard Brands, Piscataway, NJ [www.americanstandard-us.com](http://www.americanstandard-us.com) or American Standard Canada, Mississauga, ON [www.americanstandard.ca](http://www.americanstandard.ca).
  - b. Brocar Products Inc, Cincinnati, OH [www.brocar.com](http://www.brocar.com).
  - c. Chicago Faucet Co, Des Plaines, IL [www.chicagofaucets.com](http://www.chicagofaucets.com).
  - d. Dearborn Brass, Tyler, TX [www.dearbornbrass.com](http://www.dearbornbrass.com).
  - e. Delta Faucet Co, Indianapolis, IN [www.deltafaucet.com](http://www.deltafaucet.com) or Delta Faucet Canada, London, ON (519) 659-3626.
  - f. Engineered Brass Co. (EBC) (Just Manufacturing Co.), Franklin Park, IL [www.justmfg.com](http://www.justmfg.com).
  - g. Gerber Plumbing Fixtures LLC, Woodridge, IL [www.gerberonline.com](http://www.gerberonline.com).
  - h. Keeney Manufacturing Co, Newington, CT [www.keeneymfg.com](http://www.keeneymfg.com).
  - i. Kohler Co Plumbing Div, Kohler, WI [www.us.kohler.com](http://www.us.kohler.com).
  - j. McGuire Manufacturing Co, Cheshire, CT [www.mcguiremfg.com](http://www.mcguiremfg.com).
  - k. Moen Incorporated, North Olmsted, OH, or Moen Canada, Oakville, ON [www.moen.com](http://www.moen.com).
  - l. Omni Flow Controls, Harbor City, CA [www.chromomite.com](http://www.chromomite.com) or [www.omniflowcontrols.com](http://www.omniflowcontrols.com).
  - m. Plumberex Specialty Products, Palm Springs, CA [www.plumberex.com](http://www.plumberex.com).
  - n. Speakman Company, New Castle, DE [www.speakmancompany.com](http://www.speakmancompany.com).
  - o. T & S Brass & Bronze Works Inc, Travelers Rest, SC [www.tsbrass.com](http://www.tsbrass.com).
  - p. TrueBro Inc, Collierville, TN [www.truebro.com](http://www.truebro.com).
  - q. Zurn Commercial Brass, Sanford, NC [www.zurn.com](http://www.zurn.com) or Zurn Industries Ltd, Mississauga, ON (905) 795-8844.
  - r. Zurn Cast Metal, Erie, PA [www.zurn.com](http://www.zurn.com).

#### B. Performance:

1. Design Criteria:
  - a. Interior exposed pipe, valves, and fixture trim, including trim behind custom casework doors, shall be chrome plated.
  - b. Faucets and other fixture fittings shall conform to requirements of ASME A112.18.1/CSA B125.1.
  - c. Lavatories shall conform to requirements of:
    - 1) Enamelled cast iron and enamelled steel fixtures.
      - a) ASME A112.19.1/CSA B45.2.
      - b) CSA B45.2/ASME A112.19.1.
    - 2) Stainless steel plumbing fixtures:
      - a) ASME A112.19.3/CSA B45.4.
      - b) CSA B45.4/ASME A112.19.3.

#### C. Components:

1. Lavatories And Fittings:
  - a. Standard Counter Top Lavatories **L-1**:
    - 1) Size 20 by 17 inches (500 by 430 mm) nominal.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) American Standard: Aqualyn 0476.028.
      - b) Gerber: Luxoval 12-844.
      - c) Kohler: Pennington K-2196-4N.
  - b. Lavatory Fittings:
    - 1) Faucet and Grid Strainer For Standard Sinks:
      - a) Design Criteria:
        - (1) Meet NSF International Standards for Lead Free.
      - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) American Standard: Monterrey Two-Handle Centerset Lavatory Faucet with Vandal-Resistant Wrist Blade handles and grid strainer drain 5502.170.
        - (2) Chicago: 802-317CP with K7715 strainer.

- (3) Delta: 2529HDF.
  - (4) Gerber: CO-44-412.
  - (5) Kohler: K-7404-5A with K-13885 strainer.
  - (6) Moen: 8215 with 14750 grid strainer.
  - (7) Speakman: SC 3074.
  - (8) T & S: B-0890 with B-0899 Grid Strainer.
  - (9) Zurn: Z-81104 with McGuire 155A grid strainer.
- 2) Flow Control Fitting:
    - a) Design Criteria:
      - (1) Meet NSF International Standards for Lead Free.
    - b) Accessories:
      - (1) Provide vandal-proof type in place of aerator. Flow shall be 1.5 gpm.
    - c) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - (1) Omni A-200 Series by Chronomite Laboratories.
  - 3) Supply pipes with stops:
    - a) Design Criteria:
      - (1) Meet NSF International Standards for Lead Free.
    - b) Accessories:
      - (1) Provide chrome plated quarter-turn brass ball valve, 12 inches (305 mm) long braided stainless steel riser, and chrome-plated steel flange.
    - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) McGuire: BV2165CC.
      - (2) Zurn: Z8804 LRQ-PC.
  - 4) Trap:
    - a) Description:
      - (1) 17 gauge (1.4 mm) tube 'P' trap, chrome plated.
    - b) Design Criteria:
      - (1) Not required to meet NSF International Standards for Lead Free.
    - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) Dearborn.
      - (2) Engineered Brass Company (EBC).
      - (3) Keeney Manufacturing.
      - (4) McGuire.
      - (5) Zurn.
  - 5) Safety Covers for ADA Accessible Lavatories:
    - a) Description:
      - (1) Provide protection on water supply pipes and on trap.
    - b) Design Criteria:
      - (1) Not required to meet NSF International Standards for Lead Free.
    - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) Trapwrap by Brocar Products Inc.
      - (2) Pro Wrap by McGuire Products.
      - (3) Lav Guard 2 by TrueBro.
      - (4) Pro Extreme by Plumberex.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install each fixture with separate vent line. Do not circuit vent.
- B. Ensure provisions are made for proper support of fixtures and that rough-in piping is accurately set and protected from movement and damage.

- C. Seal wall-mounted fixtures around edges to wall and counter top fixtures to countertop with sealant specified in Section 07 9213.
- D. Unless otherwise noted, provide each individual fixture supply with chrome-plated stop valve with hand wheel.
- E. Install fixtures with accessible stop or control valve in each hot and cold water branch supply line.
- F. Install Safety Covers on all under sink / lavatories with exposed water supply pipes and traps.

### **3.2 CLEANING**

- A. Polish chrome finish at completion of Project.

**END OF SECTION**

# **DIVISION 23: HEATING, VENTILATING, AND AIR-CONDITIONING**

## **23 0500 COMMON WORK RESULTS FOR HVAC**

23 0501 COMMON HVAC REQUIREMENTS  
23 0713 DUCT INSULATION

## **23 3000 HVAC AIR DISTRIBUTION**

23 3001 COMMON DUCT REQUIREMENTS  
23 3114 LOW-PRESSURE METAL DUCTS  
23 3123 UNDERGROUND DUCTS  
23 3300 AIR DUCT ACCESSORIES  
23 3316 FIRE AND SMOKE DAMPERS  
23 3346 FLEXIBLE DUCTS  
23 3401 EXHAUST FANS  
23 3713 DIFFUSERS, REGISTERS, AND GRILLES

END OF TABLE OF CONTENTS

**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 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
  - 2. Section 07 9213: 'Elastometric Joint Sealant' for quality of sealants used at building exterior.
  - 3. Section 07 9219: 'Acoustical Joint Sealants' for quality of acoustical sealants.
  - 4. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.
  - 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 T7350 thermostat 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.

### 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 (240 km) 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 (2 mm) 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. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

### **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 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.
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 (9 meters) of straight run.
      - 2) Provide 12 inch (300 mm) 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 (6 mm) 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 adjustments 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:
    - b. Minimum Instruction Periods:
      - 1) ATC, HVAC and Refrigeration: Four (4) hours.
    - c. 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.

**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:
      - 1) 3 inch (76 mm) thick on unlined supply and return air ducts.

- 2) 1-1/2 inch (38 mm) thick on 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, diffuser drops, and duct silencers same as ductwork.

**END OF SECTION**

**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. 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 0713: 'Duct Insulation' for thermal insulation for ducts, plenum chambers, and casings.
  - 3. 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. Round Duct:
    - 1) Spiral Seam:
      - a) 28 ga (0.38 mm) minimum for ducts up to and including 14 inches (355 mm) in diameter.
      - b) 26 ga (0.46 mm) minimum for ducts over 14 inches (355 mm) and up to and including 26 inches (660 mm) in diameter.
    - 2) Longitudinal Seam:
      - a) 28 ga (0.38 mm) minimum for ducts up to and including 8 inches (200 mm) in diameter.

- b) 26 ga (0.46 mm) minimum for ducts over 8 inches (200 mm) and up to 14 inches (355 mm) in diameter.
- c) 24 ga (0.61 mm) minimum for ducts over 14 inches (355 mm) up to and including 26 inches (660 mm) in diameter.

### **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**

**SECTION 23 3123****UNDERGROUND DUCTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install underground ducts as described in Contract Documents.
- B. Related Requirements:
1. Section 23 3001: Common Duct Requirements.

**1.2 REFERENCES**

- A. Reference Standards:
1. ASTM International:
    - a. ASTM A653/A653M-09a, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.'

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conference: Participate in conference specified in Section 03 3111.

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

- A. Materials:
1. Ductwork:
    - a. Fiberglass-reinforced plastic duct system.
      - 1) Category Four Approved Manufacturer. See Section 01 6200 for definitions of Categories.
        - a) Spunstrand Inc, Post Falls, ID [www.spunstrand.com](http://www.spunstrand.com).
    - b. PVS or PVC coated galvanized steel duct with 4 mil thick coating on outside and on inside.
      - 1) Duct shall have and bear mark of approval of building code in authority for this Project.
      - 2) Gauges shall be as follows and be marked on each duct section. Corrugate ducts 14 inches in diameter and larger.
 

Duct Size	Gauge
a) 4 to 8 inches	26
b) 9 to 12 inches	24
c) 14 to 22 inches	22
d) 24 to 28 inches	20
e) 30 to 40 inches	18
    - c. Joint Sleeves: Galvanized sheet metal, galvanizing meeting requirements of ASTM A653/A653M, G 60.
 

Duct Size	Gauge	Width
1) 4 to 12 inches	26	4 inches
2) 14 to 24 inches	24	4 inches
3) 26 to 36 inches	22	6 inches
    - d. Metal Boots: 20 ga (0.0396 in) galvanized steel, galvanizing meeting requirements of ASTM A653, G 60.

- e. Connection Tape:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories.
    - a) Spunstrand: Sealtite PS401 sealing tape by Spunstrand Inc.
    - b) Coated Steel: Hardcast tape with Hardcast RTA-50 adhesive by Hardcast Inc, Wylie, TX [www.hardcast.com](http://www.hardcast.com).

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Spunstrand:
  - 1. Join duct sections with galvanized sheet metal sleeve inside of duct secured with sheet metal screws.
  - 2. Wipe joint area clean and apply one layer of tape. Tape shall cover all screw heads.
  - 3. Construct sheet metal boot with 1-1/2 inch flange to fit against duct. Attach boot with self-tapping sheet metal screws, pulling boot flange snug to duct surface and tape joints. Tape shall cover screw heads.
  - 4. Encase boot completely in concrete, covering well around and below taped joint.
- B. Coated Steel Duct:
  - 1. Install 6 mil polyethylene vapor barrier around duct.
  - 2. Fittings shall be PVS or PVC.
  - 3. Join duct sections, fittings, and boots with sheet metal screws as detailed on Drawings.
  - 4. Wrap duct connections, including boot connections to ducts, with two layers of specified tape installed in accordance with Manufacturer's recommendations. Cover screw heads with tape.
  - 5. Encase boot completely in concrete, covering well around and below taped joint.
  - 6. Where PVS or PVC coating has been scratched, scuffed, or peeled during shipping or installation, cover exposed metal with coating compound recommended by Manufacturer and in accordance with his recommendations.

**END OF SECTION**

**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 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 Filters Inc, Baltimore, MD [www.afinc.com](http://www.afinc.com).
    - d. Air-Rite Manufacturing, Bountiful, UT (801) 295-2529.
    - e. American Warming & Ventilating, Holland, OH [www.american-warming.com](http://www.american-warming.com).
    - f. Arrow United Industries, Wyalusing, PA [www.arrowunited.com](http://www.arrowunited.com).
    - g. Cain Manufacturing Company Inc, Pelham, AL [www.cainmfg.com](http://www.cainmfg.com).
    - h. C & S Air Products, Fort Worth, TX [www.csairproducts.com](http://www.csairproducts.com).
    - i. CertainTeed Corp, Valley Forge, PA [www.certainteed.com](http://www.certainteed.com).
    - j. Cesco Products, Florence, KY [www.cescoproducts.com](http://www.cescoproducts.com).
    - k. Daniel Manufacturing, Ogden, UT (801) 622-5924.
    - l. Design Polymeric, Fountain Valley, CA [www.designpoly.com](http://www.designpoly.com).
    - m. Ductmate Industries Inc, East Charleroi, PA [www.ductmate.com](http://www.ductmate.com).
    - n. Duro Dyne, Bay Shore, NY [www.durodyne.com](http://www.durodyne.com).
    - o. Dyn Air Inc. Lachine, QB [www.dynair.ca](http://www.dynair.ca)
    - p. Elgen Manufacturing Company, Inc. East Rutherford, NJ [www.elgenmfg.com](http://www.elgenmfg.com)
    - q. Flexmaster USA Inc, Houston, TX [www.flexmasterusa.com](http://www.flexmasterusa.com).
    - r. Greenheck Corp, Schofield, WI [www.greenheck.com](http://www.greenheck.com).
    - s. Gripnail Corp, East Providence, RI [www.gripnail.com](http://www.gripnail.com).
    - t. Hardcast Inc, Wylie, TX [www.hardcast.com](http://www.hardcast.com).
    - u. Hercules Industries, Denver, CO, [www.herculesindustries.com](http://www.herculesindustries.com).
    - v. Honeywell Inc, Minneapolis, MN [www.honeywell.com](http://www.honeywell.com).
    - w. Industrial Acoustics Co, Bronx, NY [www.industrialacoustics.com](http://www.industrialacoustics.com).

- x. Johns-Manville, Denver, CO [www.jm.com](http://www.jm.com).
- y. Kees Inc, Elkhart Lake, WI [www.kees.com](http://www.kees.com).
- z. Knauf Fiber Glass, Shelbyville, IN [www.knauffiberglass.com](http://www.knauffiberglass.com).
- aa. Manson Insulation Inc, Brossard, QB [www.isolationmanson.com](http://www.isolationmanson.com).
- bb. Metco Inc, Salt Lake City, UT (801) 467-1572 [www.metcospiral.com](http://www.metcospiral.com).
- cc. Miracle / Kingco, Rockland, MA [www.taccint.com](http://www.taccint.com).
- dd. Mon-Eco Industries Inc, East Brunswick, NJ [www.mon-ecoindustries.com](http://www.mon-ecoindustries.com).
- ee. Nailor Industries Inc, Houston, TX [www.nailor.com](http://www.nailor.com).
- ff. Owens Corning, Toledo, OH [www.owenscorning.com](http://www.owenscorning.com).
- gg. Polymer Adhesive Sealant Systems Inc, Irving, TX [www.polymeradhesives.com](http://www.polymeradhesives.com).
- hh. Pottorff Company, Fort Worth, TX [www.pottorff.com](http://www.pottorff.com).
- ii. Ruskin Manufacturing, Kansas City, MO [www.ruskin.com](http://www.ruskin.com).
- jj. Sheet Metal Connectors Inc, Minneapolis, MN [www.smconnectors.com](http://www.smconnectors.com).
- kk. Tamco, Stittsville, ON [www.tamco.ca](http://www.tamco.ca).
- ll. Techno Adhesive, Cincinnati, OH [www.technoadhesives.com](http://www.technoadhesives.com).
- mm. Titus, Richardson, TX (972) 699-1030. [www.titus-hvac.com](http://www.titus-hvac.com)
- nn. McGill AirSeal, Columbus, OH [www.mcgillairseal.com](http://www.mcgillairseal.com).
- oo. United Enertech Corp, Chattanooga, TN [www.unitedenertech.com](http://www.unitedenertech.com).
- pp. Utemp Inc, Salt Lake City, UT (801) 978-9265.
- qq. Ventfabrics Inc, Chicago, IL [www.ventfabrics.com](http://www.ventfabrics.com).
- rr. Ward Industries, Grand Rapids MI [www.wardind.com](http://www.wardind.com).
- ss. Young Regulator Co, Cleveland, OH [www.youngregulator.com](http://www.youngregulator.com).

## B. Materials:

### 1. Acoustical Liner System:

#### a. Duct Liner:

- 1) One inch (25 mm) thick, 1-1/2 lb (0.68 kg) 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 (93 deg C).
  - 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 (0.635 mm) minimum.
    - 2) Fire and smoke damper access doors shall have minimum clear opening of 12 inches (300 mm) 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 (1.6 mm) galvanized steel, single blade and opposed blade type with 3/8 inch (9.5 mm) axles and end bearings. Blade width 8 inches (200 mm) maximum. Blades shall have 1/8 inch (3 mm) 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 (1.0 mm) galvanized steel, single blade with 3/8 inch (9.5 mm) 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.
- a. 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 (200 mm) 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.
- b. 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 (13 mm) 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: BD30.
    - 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 (115 mm) wide vane rail. Junior vane rail not acceptable.
- 6. Branch Tap for Branch Ductwork:
  - a. Factory-manufactured rectangular-to-round 45 degree leading tap fabricated of 24 ga (0.635 mm) 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 (0.79 mm) minimum
    - 2) 3/8 inch (9.5 mm) minimum square rod with brass damper bearings at each end.
    - 3) Heavy-duty locking quadrant on 1-1/2 inch (38 mm) 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 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 (19 mm) long mechanical fasteners 12 inches (300 mm) 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 (300 mm) in length.
  - 2. Do not install acoustic lining in round ducts.
- B. Flexible Connections: Install flexible inlet and outlet duct connections to each furnace.
- C. Access Doors In Ducts:
  - 1. Install within 6 inches (150 mm) 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 AND SMOKE 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).
    - c. UL 555S, 'Smoke Dampers' (4th 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.
- 2. Smoke Dampers (Type 3):
  - a. Rated Class II 350 deg F (177 deg C) minimum.
  - b. Power open-fail close non-stall type motorized damper operating at 115 V and drawing 0.2 AMP maximum.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Air Balance: Model S2.
    - 2) Cesco: Model S2.
    - 3) Greenheck: Model SMD202.
    - 4) Nailor: Model 1260.
    - 5) Pottorff: SD-142.
    - 6) Ruskin: Model SD36.
    - 7) United Enertech: S-3V-II.
    - 8) Equal by Prefco as approved by Architect before bidding. See Section 01 6200.
- 3. Standard Combination Fire / Smoke Dampers (Type 4):
  - a. 1-1/2 hour rated and Class II 250 deg F (121 deg C) leakage rated minimum.
  - b. Power-open, fail-close non-stall type motorized damper operating at 115 V and drawing 0.2 AMP maximum.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Air Balance: Model FS2.
    - 2) CESCO: Model CG2.
    - 3) Greenheck: Model FSD212.
    - 4) Nailor: Model 1270 or 1290FS.
    - 5) Pottorff: Model FSD-142.
    - 6) Ruskin: Model FSD36.
    - 7) Safe-Air: Model 772.
    - 8) United Enertech: S-3V-II.
    - 9) Equal by Prefco as approved by Architect before bidding. See Section 01 6200.
- 4. Corridor Combination Fire / Smoke Dampers (Type 5):
  - a. One hour rated and Class II 250 deg F (121 deg C) leakage rated minimum for protection of tunnel type corridor ceilings with horizontal walls.

- b. Power-open, fail-close non-stall type motorized damper operating at 115 V and drawing 0.2 AMP maximum.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Air Balance: Model FS2C.
    - 2) CESCO: Model TG2C.
    - 3) Greenheck: Model CFSD212.
    - 4) Nailor: Model 1271C-1.
    - 5) Pottorff: FSD-172.
    - 6) Prefco: 5050TC.
    - 7) Ruskin: Model FSD36C.
    - 8) United Enertech: F/S-3V-CR-II.
- 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.
  - 3. Type 3, 4, And 5 Dampers:
    - a. Seals:
      - 1) Blade seals shall be mechanically locked into blade edge. Clip-on and adhesive type seals are not acceptable.
      - 2) Jamb seals shall be flexible metal compression type.
    - b. Blades:
      - 1) Type 3: 16 ga (1.59 mm) minimum steel.
      - 2) Type 4 And 5: 22 ga (0.79 mm) minimum steel.
- 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.
  - 2. Type 3: Dampers shall close on signal from smoke detectors and on power failure.
  - 3. Types 4 And 5: Dampers shall close on signal from smoke detectors, on power failure, or when temperatures at damper exceed 165 deg F (74 deg C).

## 2.2 ACCESSORIES

- A. Damper Actuators:
- 1. For Type 3, 4, and 5 dampers.
  - 2. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - a. Honeywell: ML 4115.

## 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.
  - 2. Smoke Dampers (Type 3): Install smoke dampers in ducts within 24 inches (600 mm) of where ducts penetrate smoke barriers.
  - 3. Standard Combination Fire / Smoke Dampers (Type 4): Install in ducts where ducts penetrate fire-rated smoke barriers.
  - 4. Corridor Combination Fire / Smoke Dampers (Type 5): Install in ducts where ducts penetrate fire-rated corridor ceilings.

**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: 'Standard for the Installation of Air-Conditioning and Ventilating Systems' (2012 Edition).
  - 2. Underwriters Laboratories:
    - a. UL 181, 'Factory-Made Ducts and Air Connectors' (10th 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 3401****EXHAUST FANS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install exhaust fans as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 3001: 'Common Duct Requirements'.
  - 2. Division 26: Control device and electrical connection.

**1.2 QUALITY ASSURANCE**

- A. Regulatory Agency Sustainability Approvals:
  - 1. Bear AMCA seal and UL label.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturer Contact List:
  - 1. Acme Engineering & Manufacturing Corp, Muskogee, OK [www.acmefan.com](http://www.acmefan.com).
  - 2. Broan-Nu Tone LLC, Harford, WI [www.broan.com](http://www.broan.com).
  - 3. Carnes Co., Verona, MI [www.carnes.com](http://www.carnes.com).
  - 4. Loren Cook Co., Springfield, MO [www.lorencook.com](http://www.lorencook.com).
  - 5. Soler & Palau (S&P USA Ventilation Systems, LLC), Jacksonville FL [www.solerpalau-usa.com](http://www.solerpalau-usa.com).

**2.2 MANUFACTURED UNITS**

- A. Ceiling Mounted Exhaust Fans:
  - 1. Acoustically insulated housings. Sound level rating of 5.0 sones maximum for CFM and static pressure listed on Contract Drawings.
  - 2. Include chatterproof integral back-draft damper with no metal-to-metal contact.
  - 3. True centrifugal wheels.
  - 4. Entire fan, motor, and wheel assembly shall be easily removable without disturbing housing.
  - 5. Suitably ground motors and mount on rubber-in shear vibration isolators.
  - 6. Provide wall or roof cap, as required.
  - 7. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Acme: VQ.
    - b. Broan: LoSone.
    - c. Carnes: VCD.
    - d. Cook: Gemini.
    - e. Soler & Palau: FF.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Anchor fan units securely to structure or to curb.

**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. J & J Register, Grand Rapids, MI [www.jandjreg.com](http://www.jandjreg.com).
  - 3. Krueger Air System Components, Richardson, TX [www.krueger-hvac.com](http://www.krueger-hvac.com).
  - 4. Metal\*Aire by Metal Industries Inc, Clearwater, FL [www.metalaire.com](http://www.metalaire.com).
  - 5. Nailor Industries Inc, Houston, TX or Weston, ON [www.nailor.com](http://www.nailor.com).
  - 6. Price Industries Inc, Suwanee, GA [www.price-hvac.com](http://www.price-hvac.com) or E H Price Ltd, Winnipeg, MB (204) 669-4220.
  - 7. Titus, Richardson, TX [www.titus-hvac.com](http://www.titus-hvac.com).
  - 8. Tuttle & Bailey, Richardson, TX [www.tuttleandbailey.com](http://www.tuttleandbailey.com).

**2.2 MANUFACTURED UNITS**

- A. Ceiling Return And Transfer Grilles:
  - 1. Finish: Off-white baked enamel.
  - 2. 1/2 inch (12.7 mm) spacing.
  - 3. See Contract Documents for location of filter grilles.
  - 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Carnes: RSLA.
    - b. J & J: S90H.
    - c. Krueger: S85H.
    - d. Metal\*Aire: SRH.
    - e. Nailor: 6155H.
    - f. Price: 535.
    - g. Titus: 355RL or 355 RS.
    - h. Tuttle & Bailey: T75D.
- B. 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. J & J: R-1400.
  - c. Krueger: SH.
  - d. Metal\*Aire: 5500S.
  - e. Nailor: 65OOB.
  - f. Price: SMD-6.
  - g. Titus: TDC-6.
  - h. Tuttle & Bailey: M.
- C. Door Grilles:
  1. Finish: Baked enamel. Match door as closely as possible as approved by Architect.
  2. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Carnes.
    - b. J & J.
    - c. Krueger.
    - d. Metal\*Aire.
    - e. Nailor: 61OGD.
    - f. Price: STGI-BF.
    - g. Titus: T-700.
    - h. Tuttle & Bailey.

## **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.

**END OF SECTION**

# **DIVISION 26: ELECTRICAL**

## **26 0000 ELECTRICAL**

- 26 0501 COMMON ELECTRICAL REQUIREMENTS
- 26 0519 LINE-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
- 26 0526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
- 26 0533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
- 26 0613 ELECTRICAL EQUIPMENT MOUNTING HEIGHT SCHEDULE

## **26 2000 LOW (LINE) VOLTAGE DISTRIBUTION**

- 26 2726 WIRING DEVICES

END OF TABLE OF CONTENTS

**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.
  - 4. Furnish and install Penetration Firestop Systems at electrical system penetrations as described in Contract Documents.
  
- B. Products Furnished But Not Installed Under This Section:
  - 1. Anchor bolts and templates for exterior lighting equipment bases.
  
- C. Related Requirements:
  - 1. Section 07 8400: Quality of Penetration Firestop Systems to be used on Project and submittal requirements.
  - 2. Section 31 2316: Criteria for performance of excavating.
  - 3. Section 31 2323: Criteria for performance of backfilling.

**1.2 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 2726: Wiring devices.
    - 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: Report of site tests, before Substantial Completion.
  
- C. Closeout Submittals:
  - 1. Operations And Maintenance Manual Data:
    - a. Modify and add to requirements of Section 01 7000 as follows:
      - 1) Provide operating and maintenance instructions for each item of equipment submitted under Product Data.
      - 2) Provide in addition to product data required for Section 26 5100 interior lighting fixtures, tabulation for each tritium exit sign installed on Project including following:
        - a) Serial number.
        - b) Expiration date.

- c) Installed building location (example – chapel north rear exit, north corridor east end, main west foyer, etc.).
- 3) Include copy of approved shop drawings.

### **1.3 QUALITY ASSURANCE**

- A. Requirements of Regulatory Agencies:
  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.

### **1.4 OWNER'S INSTRUCTIONS**

- A. Provide competent instructor for three days to train 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.

### **1.5 SCHEDULING**

- A. Include detailed sequence of individual electrical demolition operations on Construction Schedule specified in Section 01 3200.
- B. Coordinate with Owner for equipment and materials to be removed by Owner.

## **PART 2 - PRODUCTS**

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. All relocations, reconnections, and removals are not necessarily indicated on Drawings. Include such work without additional cost to Owner.
- B. Confirm dimensions, ratings, and specifications of equipment to be installed and coordinate these with site dimensions and with other Sections.

### **3.2 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.



- D. Remove concealed wiring 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.

### **3.3 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.
- B. Install Penetration Firestop System appropriate for penetration at electrical system penetrations through walls, ceilings, and top plates of walls.

### **3.4 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.

### **3.5 CLEANING**

- A. Remove obsolete raceways, conductors, apparatus, and lighting fixtures promptly from site and dispose of legally.

**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: 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.

**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. 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.
    - c. 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.

- 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 so neutral conductors will carry only unbalanced current. 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 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**

**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.
  - 2. Furnish and install building telephone / data system cables as described in Contract Documents.
  
- B. Related Requirements:
  - 1. Section 01 1000: Owner will terminate building telephone cables at terminal board.
  - 2. Section 23 0933: Cables for Temperature Control System.
  - 3. Section 26 0501: Common Electrical Requirements.
  - 4. Section 28 3101: Cables for Fire Detection System.

**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. 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.
  - 3. Run exposed cables parallel to or at right angles to building structure lines.
  - 4. Keep cables 6 inches 150 mm minimum from hot water pipes.
  - 5. Support cables using approved staples, cable ties, straps, hangers, or similar fittings spaced every 3 feet.
  - 6. Where installing in framing, do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width. Holes shall be one half inch diameter maximum.

7. Bundle only cables of same systems together.

**END OF SECTION**

**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 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conference: Participate in pre-installation conference specified in Section 03 3111.

**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: Size materials as shown on Drawings and in accordance with applicable codes.
- C. Materials:
  - 1. Grounding And Bonding Jumper Conductors: Bare copper or 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. Electrical service, its equipment and enclosures.
  - 2. Conduits and other conductor enclosures.
  - 3. Neutral or identified conductor of interior wiring system.

4. Main panelboard, power and lighting panelboards.
  5. 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 1 800 mm 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 phase conductors up through #10 AWG.
    2. Use NEC Table 250-95 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.

**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.
- 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. Steel City, Div Thomas & Betts, Memphis, TN [www.tnb.com](http://www.tnb.com) or Thomas & Betts Ltd, Iberville, PQ (450) 347-5318.
    - e. Thomas & Betts, Memphis, TN [www.tnb.com](http://www.tnb.com).
    - f. Walker Systems Inc, Williamstown, WV (800) 240-2601 or Walker Systems Inc / Wiremold Canada Inc, Fergus, ON (519) 843-4332.
    - g. 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) **3/4 inch 19 mm** for exterior use, unless indicated otherwise.
      - 2) **1/2 inch 13 mm** for interior use, 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) and Flexible Steel 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.
- 4) Listed, Liquid-Tight Flexible Metal Conduit:
  - a) Use in outdoor final connections to mechanical equipment, length not to exceed **36 inches 900 mm**.
- 5) Pre-wired **3/8 Inch 10 mm** Flexible Fixture Whips: Allowed only for connection to recessed lighting fixtures, lengths not to exceed **72 inches 1 800 mm**.
- c. Prohibited Raceway Materials:
  - 1) Aluminum conduit.
  - 2) Armored cable type AC (BX) cable.
- 2. Raceway And Conduit Fittings:
  - a. Rigid Steel Conduit And IMC: Threaded and designed for conduit use.
  - b. EMT:
    - 1) Compression type.
    - 2) 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. Telephone / data outlet boxes shall be single device outlet boxes.
  - d. 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.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. 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.
    - a. Coordinate location of outlet for water cooler with Division 22.
    - b. Coordinate location of outlets adjacent to or in millwork with Division 06 before rough-in. Refer conflicts to Architect and locate outlet under his direction.
  3. Install pull wires in raceways installed under this Section where conductors or cables are to be installed under other Divisions.
- B. General:
1. Sound and video system electrical components furnished and installed under this Section include following items:
    - a. Metal equipment cabinet and control cabinets.
    - b. Factory-fabricated speaker enclosures.
    - c. Fittings.
- C. 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. Install insulated bushings on each end of raceway **1-1/4 inches 32 mm** in diameter and larger, and on all raceways where cables emerge. Install expansion fittings where raceways cross building expansion joints.
  6. Run two spare conduits from each new panelboard to ceiling access area or other acceptable accessible area and cap for future use.
  7. Bend PVC conduit by hot box bender and, for PVC **2 inches 50 mm** in diameter and larger, expanding plugs. Apply PVC adhesive only by brush.
  8. 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.
  9. 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.
  10. 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.
  11. 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.
12. 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.
- D. Telephone / Data Systems:
1. Install main service raceway as directed by Telephone Company. Leave pull wire in raceway.
  2. Install raceway from terminal board to each telephone and data outlet as indicated on Drawings.
- E. 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. Location:
    - a. Install boxes at door locations on latch side of door, unless explicitly shown otherwise on Drawings. Verify door swings shown on electrical drawings with architectural drawings, and report discrepancies to Architect before rough-in. Distance of box from jamb shall be within **6 inches 150 mm** of door jamb.
    - b. Properly center boxes located in walls with respect to doors, panels, furring, trim and consistent with architectural details. Where two or more outlets occur, space them uniformly and in straight lines with each other, if possible.
    - c. Center ceramic tile boxes in tile.
- F. Support factory-fabricated speaker enclosures from structure or ceiling suspension system.

**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. Electrical:
    - a. Receptacles: 18 inches 450 mm.
    - b. Wall Switches: 42 inches 1 050 mm.
  2. Communications
    - a. Sound Distribution System Components: As indicated on Drawings.
    - b. Satellite Distribution System Components: As indicated on Drawings.
    - c. TV Distribution System Components: As indicated on Drawings.
    - d. Computer and TV: 18 inches 450 mm.
    - e. Telephone / Data Terminal Boards: 72 inches 1 800 mm to top.
    - f. Telephones (wall type): 60 inches 1 500 mm.
    - g. Telephones (desk type): 18 inches 450 mm.
    - h. Signal Chimes: 84 inches 2 100 mm.

**END OF SECTION**

**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. 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.
    - h. Lightolier Controls, Dallas, TX [www.lolcontrols.com](http://www.lolcontrols.com) or Lightolier CFI, Lachine, QB (800) 565-5486 or (514) 636-0670.
    - i. Lutron Electronics Co Inc, Coopersburg, PA [www.lutron.com](http://www.lutron.com).
    - j. Novitas Inc, Peachtree City, GA [www.novitas.com](http://www.novitas.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. Red Dot div of Thomas & Betts, Memphis, TN [www.tnbcom](http://www.tnbcom).
    - o. Siemon Company, Watertown, CT [www.siemon.com](http://www.siemon.com).
    - p. Square D Co, Palatine, IL [www.squared.com](http://www.squared.com).
    - q. Suttle, Hector, MN [www.suttleonline.com](http://www.suttleonline.com).
    - r. Tork Inc, Mount Vernon, NY [www.tork.com](http://www.tork.com).
    - s. 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 and brown on dark walls.
- B. Switches:
  - 1. If existing are decora style then use the following Rectangular Face Designer Style:
    - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
      - 1) 20 AMP, single pole:

- a) Cooper: DECB120W.
- b) Hubbell: HBL2121WA.
- c) Leviton: 5621-2W.
- d) Pass & Seymour: 2621-W.
- 2) Two Pole:
  - a) Cooper: DECB220W.
  - b) Hubbell: HBL2122WA.
  - c) Leviton: 5622-2W.
  - d) Pass & Seymour: 2622-W.
- 3) Three Way:
  - a) Cooper: DECB320W.
  - b) Hubbell: HBL2123WA.
  - c) Leviton: 5623-2W.
  - d) Pass & Seymour: 2623-W.
- 4) Four Way:
  - a) Cooper: DECB420W.
  - b) Hubbell: HBL2124WA.
  - c) Leviton: 5624-2W.
  - d) Pass & Seymour: 2624-W.
- 5) Pilot Switch:
  - a) Single Pole:
    - (1) Cooper: 2221PL.
    - (2) Hubbell: HBL1221PL.
    - (3) Pass & Seymour: PS20AC1-RPL.
    - (4) Leviton: 1221-PLR.

C. Receptacles:

- 1. If existing are decora then use the following Rectangular Face Designer Style:
  - a. 15 AMP, specification grade, back and side wired, self grounding.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
    - 1) Cooper: 6262W.
    - 2) Hubbell: HBL2152WA.
    - 3) Leviton: 16252-W.
    - 4) Pass & Seymour: 26252-W.
- 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. Telephone Jacks:

- 1. Desk Type:
  - a. 4 conductor, screw terminals, voice grade.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
    - 1) Cooper: 3532-4W.
    - 2) Leviton: 40249-W.
    - 3) Pass & Seymour: TPTE1-W.
    - 4) Suttle: 625B4-4-85.
- 2. Wall Type:
  - a. 4 conductor, screw terminals, voice grade.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
    - 1) Cooper: 3521-4W.
    - 2) Leviton: 40257-W.
    - 3) Pass & Seymour: WMTE14-W.
    - 4) Suttle: 630AC4-85.
- 3. Module Type:
  - a. For use in data faceplates.
  - b. 8 conductor, punch-down, voice grade.

- c. Type Two Acceptable Products:
  - 1) Simon: MX3-F-U3-02
  - 2) Equal as approved by Architect before use. See Section 01 6200.
- E. 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: Stainless Steel.
    - c. Ganged switches shall have gang plates.
    - d. Category Four Approved Products. 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.
- F. 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) Leviton:
        - a) Sensor: OSC10-U
        - b) Relay / Transformer: OSP20-OD)
      - 2) Hubbell:
        - a) Sensor: OMNI-US500.
        - b) Relay / Transformer: 120 V: MP 120 A.
      - 3) Novitas:
        - a) Sensor: 01-083.
        - b) Relay / Transformer: 120 / 277 V, 13-0511.
      - 4) Pass & Seymour: 120 V.
        - a) Sensor: US1001.
        - b) Relay / Transformer: PWP120.
      - 5) Tork:
        - a) Sensor: SC20.
        - b) Relay / Transformer: 120 V: TRP1.
      - 6) Watt Stopper:
        - a) Sensor: W-500A.
        - Relay / Transformer: 120 V: B120E-P.
    - c. SDSA1175 by Square D.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install devices flush with walls, straight, and solid to box.



- B. Label dimmer switch groupings with **1/16 inch (1.6 mm)** thick laminated plastic composition material with contrasting color core. Engraved letter shall be **1/4 inch (6 mm)** high.

**END OF SECTION**

# **DIVISION 33: UTILITIES**

## **33 3000 SANITARY SEWERAGE UTILITIES**

33 3313 SANITARY UTILITY SEWERAGE

END OF TABLE OF CONTENTS

**SECTION 33 3313****SANITARY UTILITY SEWERAGE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Perform excavating and backfilling required for work of this Section.
  - 2. Furnish and install sanitary sewage system as described in Contract Documents beginning from where it enters building and connecting to serving sewer system.
  
- B. Related Requirements:
  - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
    - a. Pre-installation conference held jointly with concrete specifications.
  - 2. Section 22 1313: 'Facility Sanitary Sewers' for sanitary sewage system within building and within **5 feet (1.50 meter)** of building.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 03 3111.

**1.3 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A74-16, '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 C1277-15, 'Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings'.
    - e. ASTM D2235-04(2011), 'Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings'.
    - f. ASTM D2321-14, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'.
    - g. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
    - h. ASTM D2661-14, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings'.
    - i. ASTM D2665-12, 'Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings'.
    - j. ASTM D3034-15, 'Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings'.
    - k. ASTM F656-15, 'Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings'.
  - 2. Cast Iron Soil Pipe Institute:
    - a. CISPI 301-12, 'Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications'.
    - b. CISPI 310-12, '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).
3. International Code Council:
  - a. ICC IPC-2015, 'International Plumbing Code'.

## 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals
  1. Install cleanouts in accordance with local governing authority and State codes.

## PART 2 - PRODUCTS

### 2.1 COMPONENTS

- A. ABS:
  1. ABS Schedule 40 solid wall plastic pipe and fittings meeting requirements of ASTM D2661 joined with pipe cement meeting requirements of ASTM D2235.
- B. Cast Iron Soil Pipe And Fittings:
  1. Meet requirements of ASTM A74, Service Grade:
    - a. Cast iron for bell and spigot fittings.
    - b. Cast iron for no-hub joints.
  2. Approved Joint Material And Manufacturers:
    - a. For Bell And Spigot Pipe: Rubber gaskets meeting requirements of ASTM C564 and compatible with pipe used.
    - b. For No-Hub Pipe:
      - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) SuperGrip 304 American Brass & Iron (AB&I), Oakland, CA [www.abifoundry.com](http://www.abifoundry.com).
        - b) Husky SD 4000 coupling by Anaco-Husky, Corona, CA [www.anaco-husky.com](http://www.anaco-husky.com).
        - c) Neoprene gaskets with type 304 stainless steel clamp and 24 ga type 304 stainless steel housing by Clamp-All Corp, Haverhill, MA [www.clampall.com](http://www.clampall.com).
        - d) MG Coupling by MG Piping Products Co, Stanton, CA [www.mgcoupling.com](http://www.mgcoupling.com).
- C. PVC:
  1. Schedule 40 solid wall plastic pipe and fittings meeting requirements of ASTM D2665 joined using cement primer meeting requirements of ASTM F656 and pipe cement meeting requirements of ASTM D2564.
  2. Gasket joint gravity sewer pipe and fittings meeting requirements of ASTM D3034. Joints shall be integral wall and elastomeric gasket.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  1. Before installation, inspect pipe for defects and cracks.
  2. Do not use defective, damaged, or unsound pipe.

### 3.2 PREPARATION

- A. Excavate and backfill trenches:
  1. Runs shall be as close as possible to those shown on Contract Drawings.
  2. Excavate to required depth and grade to obtain fall required.
  3. Bottom of trenches shall be hard. Tamp as required.

4. Remove debris from trench before laying pipe.
5. Do not cut trenches near footings without consulting Architect/Engineer.
6. Excavate trenches so outside pipe will be **12 inches (300 mm)** minimum below frost line.

### 3.3 INSTALLATION

#### A. General:

1. When work is not in progress, close open ends of pipe and fittings so no trench water, soil, or other substances will enter pipes or fittings.
2. Keep trenches free from water until pipe jointing material has set. Do not lay pipe when condition of trench or weather is unsuitable for such work.
3. Trench width at top of pipe:
  - a. Minimum: **18 inches (450 mm)** or diameter of pipe plus **one foot (305 mm)**, whichever is greater.
  - b. Maximum: Outside diameter of pipe plus **two feet (610 mm)**.

#### B. Placing And Laying of Underground Pipe:

1. Deflections from straight line or grade, as required by vertical curves, horizontal curves, or offsets, shall not exceed **6/D inches per linear foot (12 500/D mm per m)** of pipe where D represents nominal diameter of pipe expressed in **inches mm**
2. Deflections to be determined between center lines extended of two connecting pipes.
3. If alignment requires deflection in excess of these limitations, provide special bends or sufficient number of shorter lengths of pipe to provide angular deflections within limits approved by Architect.
4. Laying:
  - a. Pipe laying shall proceed up-grade with spigot ends of bell-and-spigot pipe pointing in direction of flow.
  - b. Lay each pipe true to line and grade and in such manner as to form close concentric joint with adjoining pipe and to prevent sudden offsets of flow line.
  - c. As work progresses, clear interior of pipe of dirt and superfluous materials. Where cleaning after laying is difficult because of small pipe, keep suitable swab or drag in pipe and pull forward past each joint immediately after jointing has been completed.
5. Make joints between cast iron pipe and other types of pipe with standard manufactured cast-iron adapters and fittings.
6. Valve, plug, or cap, as directed by Architect, where pipe ends are left for future connections.

#### C. Cast Iron Pipe And Fittings:

1. Shape trench bottom to give substantially uniform circumferential support to lower third of each pipe. 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.

#### D. Thermoplastic Pipe And Fittings:

1. Install in accordance with Manufacturer's recommendations and ASTM D2321.
2. Stabilize unstable trench bottoms.
3. Bed pipe true to line and grade with continuous support from firm base.
  - a. Bedding depth: **4 to 6 inches (100 to 150 mm)**.
  - b. Material and compaction to meet ASTM standard noted above.
4. Excavate bell holes into bedding material so pipe is uniformly supported along its entire length. Blocking to grade pipe is forbidden.
5. Piping and joints shall be clean and installed according to Manufacturer's recommendations. Break down contaminated joints, clean seats and gaskets and reinstall.
6. Do not use back hoe or power equipment to assemble pipe.
7. Initial backfill shall be **12 inches (305 mm)** above top of pipe with material specified in referenced ASTM standard.
8. Compact trench backfill to 90 percent.
9. Minimum cover over top of pipe:
  - a. **36 inches (915 mm)** before allowing vehicular traffic over pipe.

- b. **48 inches (1 200 mm)** before use of compaction equipment other than hand or impact tampers.

### **3.4 FIELD QUALITY CONTROL**

#### **A. Non-Conforming Work:**

- 1. Failure to install joints properly shall be cause for rejection and replacement of piping system at no additional cost to Owner.

**END OF SECTION**