

PROJECT MANUAL

FOR THE CONSTRUCTION OF

**RICHFIELD DESERET INDUSTRIES ADDITION
UT SOUTH AREA WELFARE STAKE
LDS #527-5822-WEC18503**

700 South Main Street
Richfield, UT 84701

ARCHITECT

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PCA #: 1620
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BIDDING REQUIREMENTS

FIXED SUM PROJECT (U.S.)

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INVITATION TO BID (U.S.)

1. GENERAL CONTRACTORS INVITED TO BID THE PROJECT:

By Invitation Only

2. PROJECT:

Richfield Deseret Industries Addition
UT South Area Welfare Stake LDS
#527-5822-WEC18503

3. LOCATION:

700 South Main Street
Richfield, UT 84701

4. OWNER:

Corporation of the Presiding Bishop of
The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole
c/o
Special Projects Department
50 E. North Temple, 10th Floor
Salt Lake City UT 84150

5. CONSULTANT:

P.C. Architects, Inc.
Dennis B. Patten, Architect
301 E Tabernacle, Ste. 206
St. George, UT 84770
(435) 673-6579
pcarch@pcarchinc.com

6. DESCRIPTION OF PROJECT:

- A. 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.
- B. Buildings: 1-Story Above Grade = 1 – Total square feet ± 2,128 sq. ft. – Foundation – Waterproofing – CMU Walls - Frame Wood – Floor Construction Slab – Roof Framing – Wood Joists – Glass – Exterior Doors Specialty Service – Exterior Doors Storefront – Roof Covering Single-Ply Membrane – Interior Partitions – Gypsum Board – Floor Finish Carpeting, and Resilient Tile – Interior Wall Finish Paint – Ceiling Finish Acoustical – Concrete Walks.

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 One-Hundred Eighty (180) calendar days and will be as noted in the Agreement.

9. BID OPENING: Sealed bids will be received at time and place to be announced. Bids will be publicly opened at same time and place.

10. BIDDING DOCUMENTS:

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

- 1) AGC Utah
230 N 1680 E, #B-1,
St. George, UT 84790
435.628.1346
- 2) Mountainlands Area Plan Room
334 W Tabernacle, Bldg. J, Ste. 9,
St. George UT 84770
435.225.0919
- 3) Mountainlands Area Plan Room
583 W 3560 S, Ste. 4
Salt Lake City, UT 84115
801.288.1188

B. Bidding Documents may be obtained at the Architect's office with a refundable deposit of \$150.00 per set. Deposit will be refunded if documents are returned complete and in good condition within five days of bid opening.

11. BID BOND: Bid security in the amount of 5 percent (5%) of the bid will accompany each bid in accordance with the Instruction to Bidders.

12. BIDDER'S QUALIFICATIONS: Bidding by the General Contractors will be by invitation only.

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

END OF DOCUMENT

INSTRUCTIONS TO BIDDERS (U.S.)

1. DEFINITIONS:

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

2. BIDDER'S REPRESENTATIONS:

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

3. BIDDING DOCUMENTS:

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

approved by Architect before installation. See Section 016000,' appears. In Sections where the afore-mentioned statements do not appear and a different heading is used, Architect is authorized as Owner's representative to decline consideration of requests for approval of equal products. Approvals of equal products in such Sections must be made by Owner and will generally be for subsequent Projects.

- D. Addenda - Addenda will be sent to bidders and to locations where Bidding Documents are on file no later than one week prior to bid opening or by fax no later than 48 hours prior to bid opening.

4. BIDDING PROCEDURES:

A. Form and Style of Bids

- 1) Use Owner's Bid Form.
- 2) Fill in all blanks on Bid Form. Signatures will be in longhand and executed by representative of bidder duly authorized to make contracts.
- 3) Bids will bear no information other than that requested on bid form. Do not delete from or add to the information requested on the bid form.

B. Bid Security

- 1) Each bid will be accompanied by a bid bond naming Owner, as listed in the Agreement, as obligee. If Bidder refuses to enter into a Contract or fails to provide bonds and insurance required by the General Conditions, amount of bid security will be forfeited to Owner as liquidated damages, not as a penalty.
- 2) Bid bond will be issued by a surety company meeting requirements of the General Conditions for surety companies providing bonds and will be submitted on AIA Document A310, Bid Bond or AIA authorized equivalent provided by surety company. The attorney-in-fact who executes the bond on behalf of the surety will affix to the bond a certified and current copy of the power of attorney.
- 3) Owner may retain bid security of bidders to whom an award is being considered until -
 - a. Contract has been executed and bonds have been furnished,
 - b. Specified time has elapsed so bids may be withdrawn, or
 - c. All bids have been rejected.

C. Submission of Bids

- 1) Submit bid in sealed opaque envelope containing only bid form and bid security. Envelopes will be sealed, bear bidder's name, and include the following:

BID FOR

Richfield Deseret Industries Addition
UT South Area Welfare Stake LDS#
527-5822-WEC18503

If bid is sent by mail, enclose sealed envelope in separate mailing envelope with notation 'SEALED BID ENCLOSED' on face.

- 2) It is bidder's sole responsibility to see that its bid is received at specified time. Bids received after specified bid opening time will be returned to bidders unopened.
- 3) No oral, facsimile transmitted, telegraphic, or telephonic bids, modifications, or cancellations will be considered.

D. Modification or Withdrawal of Bid

- 1) Bidder guarantees there will be no revisions or withdrawal of bid amount for 45 days after bid opening.
- 2) Prior to bid opening, bidders may withdraw bid 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. Rejection of Bids - Owner reserves right to reject any or all bids and to waive any irregularity therein.
- C. Acceptance of Bid
 - 1) No bidder will consider itself under contract after opening and reading of bids until Agreement between Owner and Contractor is fully executed.
 - 2) Bidder's past performance, organization, subcontractor selection, equipment, and ability to perform and complete its contract in manner and within time specified, together with amount of bid, will be elements considered in award of contract.

6. POST-BID INFORMATION:

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

7. PERFORMANCE BOND AND PAYMENT BOND:

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

8. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:

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

9. MISCELLANEOUS:

- A. Pre-Bid Conference
 - 1) A pre-bid conference will be held at a time and place to be announced.
- B. Liquidated Damages - Conditions governing liquidated damages are specified in the General Conditions and in the Supplementary Conditions.
- C. Examination Schedule for Existing Building and Site
 - 1) At Pre-Bid Meeting or as scheduled and coordinated with FM Group.
- D. Exemption from local taxes - See Supplementary Conditions

END OF DOCUMENT

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SUBCONTRACTORS AND MAJOR MATERIALS SUPPLIERS LIST

Project Name: _____ Date: _____

Stake: _____ Project No: _____

General Contractor: _____

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

VMR SUBCONTRACTORS

Roofing _____

Doors, Frames & Hardware _____

Storefronts _____

Other _____

Other _____

SUBCONTRACTORS AND SUPPLIERS

Grading / Site work _____

Site Utilities _____

Demolition _____

Paving _____

Termite Control _____

Site Concrete _____

Fencing _____

Irrigation System _____

Landscaping _____

Building Concrete _____

Masonry _____

Structural Steel _____

Framing _____

Trusses _____

Insulation _____

Soffit / Fascia _____

Millwork _____

Drywall _____

Ceramic Tile _____

Acoustical Tile _____

Painting _____

Wall Coverings _____

Draperies _____

Fire Sprinklers _____

Plumbing _____

HVAC _____

Electrical _____

Controls _____

Sound / Satellite _____

EQUAL PRODUCT APPROVAL REQUEST FORM (U.S.)

Project Name: _____ Request Number: _____

TO: _____

FROM: _____

BID DATE: _____

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

PROPOSED EQUAL PRODUCT:

Specification Section: _____

Specified Products: _____

Proposed Product: _____

The Undersigned certifies:

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

ATTACHMENTS:

Include the following attachments -

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

SIGNED: _____

Printed Name _____

Company _____

Address _____

City, State, Zip Code _____

Telephone _____ Fax _____

REVIEW COMMENTS:

_____ Accepted. See Addenda Number _____.

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

_____ Proposed equal product not acceptable. Use specified products.

_____ Not Reviewed. Submission received too late. Use specified products.

ADDITIONAL COMMENTS:

BY: _____ **DATE:** _____

BID FORM

FOR GENERAL CONTRACT WORK (U.S.)

PROJECT IDENTIFICATION: **Richfield Deseret Industries Addition**
UT South Area Welfare Stake
LDS# 527-5822-WEC18503

OWNER: Corporation of the Church of Jesus Christ of Latter-day Saints, a Utah
corporation sole ("Owner")
"Special Projects Department, 10th Floor
50 E. North Temple, Salt Lake City UT 84150"

ARCHITECT: Dennis B. Patten, Architect
P.C. Architects, Inc.
301 E Tabernacle, Ste. 206
St. George, UT 84770
(435) 673-6579 - pcarch@pcarchinc.com

BID

1. In submitting this Bid, Bidder represents that:
 - a. If this Bid is accepted, Bidder will enter into an agreement with Owner to perform and furnish the Work described in the Bidding Documents for the Bid Price and within the Time of Substantial Completion indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
 - b. Bidder has carefully examined Set(s) Number _____ of the Bidding Documents consisting of the Project Manual containing the Bidding Requirements, the Conditions of the Contract, and:

The Specifications, entitled: _____,

The Drawings entitled _____ and dated _____, and

including sheets numbered _____, and addenda numbers _____. - c. Bidder has examined the site of the work, existing conditions, and all other conditions affecting the work on the above-named Project.
 - d. Bidder has carefully correlated the information known to Bidder and information and observations obtained from visits to the site with the Bidding Documents.
 - e. Bidder is familiar with federal, State, and local laws and regulations applicable to Project.
 - f. Bidder guarantees there will be no revisions or withdrawal of bid amount for forty-five (45) days after the bid opening.
2. Bidder hereby proposes to furnish all materials, labor, equipment, tools, transportations, services, licenses, fees, permits, etc., required by said documents to complete the Work described by the Contract Documents for the lump-sum of:
_____ Dollars

(\$ _____).
3. Bidder agrees to achieve substantial completion of the Work within the number of days indicated in the Invitation to Bid.
4. Enclosed is a Bid Bond for not less than five percent (5%) of the bid.

RESPECTFULLY SUBMITTED:

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

Date

License No.

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: Richfield Deseret Industries Addition

Building Plan Type: Existing D.I.

Building Address: 700 South Main Street, Richfield, UT 84701

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

Project Number: LDS# 527-5822-WEC18503

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

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

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

1. Property/Project.

Property/Project Number:
Property Address ("Project Site"):

Project Type:
Project Name ("Project"):

Stake Name:

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

3. Contract Documents.

- a. The Contract Documents consist of:
 - 1) This Agreement;
 - 2) The General Conditions for a Fixed Sum (U.S.), the Supplementary Conditions for a Fixed Sum (U.S.), and the Specifications (Divisions 01 through 49) contained in the Project Manual entitled _____, dated _____ and prepared by _____ ("Architect");
 - 3) The Drawings prepared by Architect entitled _____, sheet numbers _____, dated _____;
 - 4) Addendum No. _____ dated _____; and
 - 5) All Modifications to the Contract Documents.
- b. The Contract Documents are incorporated into this Agreement by reference as if fully set forth herein.
- c. The definitions set forth in the General Conditions for a Fixed Sum (U.S.) will apply to the Contract Documents.
- d. The Contract Documents contain the entire and integrated agreement between the parties hereto and supersede all prior negotiations, representations, or agreements, either written or oral.
- e. Modifications or other amendments to the Contract Documents must be in writing and as provided in the General Conditions for a Fixed Sum (U.S.).

4. Time of Commencement and Substantial Completion.

- a. Contractor will commence the Work on the date for commencement set forth in the Written Notice to proceed from Owner to Contractor.
- b. Contractor will achieve Substantial Completion and have the Work ready for Owner's inspection no later than _____ (_____) days from the date of commencement set forth in the Written Notice to proceed from Owner to Contractor, as adjusted in accordance with the Contract Documents.
- c. Time is of the essence.

5. Contract Sum.

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

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

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

8. **Notice.** The parties designate the addresses, facsimile numbers, and email addresses as set forth in the signature blocks below to be used for sending Written Notice to the other party:
9. **Effective Date.** The effective date of this Agreement is the date indicated by the Owner's signature.

OWNER:	CONTRACTOR:
The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole	(company)
Signature: _____	Signature: _____
Print Name: _____	Print Name: _____
Title: _____	Title: _____
Address: _____	Address: _____
_____	_____
Telephone No: _____	Telephone No: _____
Facsimile No: _____	Facsimile No: _____
Email: _____	Email: _____
Effective Date: _____	Fed. I.D. or SSN: _____
_____	License No: _____
Reviewed By: _____	Date Signed: _____

FORM OF AGREEMENT

GENERAL CONDITIONS

For a Fixed Sum (U.S.)

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SECTION 1 - GENERAL PROVISIONS

1.1 DEFINITIONS

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

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

1.2 CORRELATION AND INTENT OF CONTRACT DOCUMENTS

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

1.3 OWNERSHIP AND USE OF CONTRACT DOCUMENTS

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

1.4 PUBLIC STATEMENTS REGARDING PROJECT

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

1.5 OWNERSHIP AND USE OF RENDERINGS AND PHOTOGRAPHS

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

1.6 NO COMMERCIAL USE OF TRANSACTION OR RELATIONSHIP

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

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

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

1.7 CONFIDENTIALITY / PROPERTY RIGHTS

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

1.8 COMPLY WITH INTELLECTUAL PROPERTY RIGHTS OF OTHERS

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

SECTION 2 - OWNER

2.1 OWNER'S DESIGNATED REPRESENTATIVE

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

2.2 INFORMATION AND SERVICES REQUIRED OF OWNER

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

2.3 OWNER'S RIGHT TO INSPECT THE WORK

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

2.4 OWNER'S RIGHT TO STOP THE WORK

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

SECTION 3 - CONTRACTOR

3.1 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

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

3.2 SUPERVISION OF CONSTRUCTION PROCEDURES

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

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

3.3 LABOR AND MATERIALS

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

3.4 COMPLIANCE WITH LAWS

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

3.5 TAXES

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

3.6 PERMITS AND FEES

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

3.7 CONTRACTOR'S ON-SITE REPRESENTATIVE

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

3.8 CONTRACTOR'S CONSTRUCTION SCHEDULES

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

3.9 DOCUMENTS AND SUBMITTALS AT THE SITE

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

3.10 SUBMITTALS

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

3.11 CUTTING AND PATCHING

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

3.12 ACCESS TO WORK

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

3.13 ROYALTIES AND PATENTS

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

3.14 INDEMNIFICATION

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

3.15 PROJECT MEETINGS

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

SECTION 4 - ADMINISTRATION OF THE CONTRACT

4.1 ARCHITECT

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

4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT

- A. Architect will make periodic visits to the site to familiarize itself generally with the progress and quality of the Work and to determine if the Work is proceeding in accordance with the Contract Documents. Although Architect is required to make periodic inspections, it is not required to make exhaustive or continuous onsite inspections. On the basis of its observations while at the site, Architect will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defects and deficiencies in the Work. Architect's failure to observe a defect or deficiency in the Work will not relieve Contractor of its duty to perform the Work in accordance with the Contract Documents.
- B. Architect will review Contractor's payment requests and determine the amounts due Contractor in accordance with Section 9.
- C. Communications between Contractor and Owner relating to the Work will be through Architect. Communications between Owner or Contractor with Architect's consultants relating to the Work will be through Architect. Communications between Owner or Architect and subcontractors relating to the Work will be through Contractor. Communications between Contractor and any separate contractor will be through Architect, except as otherwise specified in the Contract Documents.
- D. Owner and/or Architect will have the right to reject and require removal of the following at Contractor's expense:
 - 1. Any portion of the Work that does not meet the requirements of the Contract Documents.
 - 2. Any portion of the Work damaged or rendered unsuitable during installation or resulting from failure to exercise proper protection.

- E. Architect will have authority to suspend the Work, with concurrence of Owner, whenever such suspension may be necessary in its reasonable opinion to insure the proper performance of the Work.
- F. Architect will review Contractor's Submittals and will accept or take other appropriate action regarding the Submittals. Architect's review of the Submittals will be for the limited purpose of checking for general conformance with the Contract Documents and will not be conducted for the purpose of determining the accuracy and completeness of details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of Contractor. Architect's review of Submittals will not relieve Contractor of its obligations under the Contract Documents. Architect's review of Submittals will not constitute acceptance of safety precautions or construction means, methods, techniques, sequences or procedures. Architect's acceptance of a specific item will not indicate acceptance of an assembly of which the item is a component.
- G. Architect has authority to order Construction Change Directives and Field Changes in accordance with Section 7.
- H. Architect will conduct inspections to determine the dates of Substantial Completion and final completion, will receive and review written guarantees and related documents required by the Contract and assembled by Contractor, and will review and certify or reject Contractor's final payment request.
- I. Architect will be the interpreter of the performance and requirements of the Contract Documents. Architect's interpretations will be in writing or in the form of drawings.
- J. Architect's decisions in matters relating to aesthetic effect will be final if consistent with the Contract Documents and approved by Owner.

SECTION 5 - SUBCONTRACTORS

5.1 AWARD OF SUBCONTRACTS FOR PORTIONS OF THE WORK

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

5.2 SUBCONTRACTUAL RELATIONS

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

SECTION 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

6.2 MUTUAL RESPONSIBILITY

- A. Contractor will afford other contractors reasonable opportunity to place and store their materials and equipment on site and to perform their work and will properly connect and coordinate its Work with theirs where applicable.
- B. If any part of Contractor's Work depends upon the work of any separate contractor for proper performance or results, Contractor will inspect and promptly report to Architect any apparent discrepancies or defects in such work that render it unsuitable for proper performance and results. Failure of Contractor to so inspect and report will constitute an acceptance of the work of the separate contractor as fit and proper to receive Contractor's Work, except as to defects not then reasonably discoverable.
- C. Contractor will promptly remedy damage caused by Contractor or any Subcontractor to the completed or partially completed work of other contractors or to the property of Owner or other contractors.

6.3 OWNER'S RIGHT TO CLEAN UP

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

SECTION 7 - CHANGES IN THE WORK

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

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

- H. Contractor agrees that it is responsible for submitting accurate cost and pricing data to support its Change Order Proposals. Owner will have the right to examine the Contractor's records to verify the accuracy and appropriateness of the pricing data used to price change order proposals.

7.2 CHANGE IN THE WORK RESULTING FROM AN EVENT OR CIRCUMSTANCE

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

7.3 EXTENSIONS OF TIME

- A. If Substantial Completion of the Project is delayed because of any of the following causes, then the Contract Time will be extended by Change Order for a period of time equal to such delay:
1. Labor strikes or lock-outs;
 2. Adverse weather;
 3. Unusual delay in transportation;
 4. Unforeseen governmental requests or requirements;
 5. A Change in the Work resulting from an instruction by Owner or Architect to Contractor subject to the conditions set forth in Section 7.1; or
 6. Any other event or circumstance caused by the willful or negligent act or omission of Owner or Architect.
- B. Contractor will not be entitled to any compensation for delay described in Section 7.3, Paragraph A, subparagraphs 1, 2, 3 and 4. For each day of delay in Substantial Completion described in Section 7.3, Paragraph A, subparagraphs 5 and 6, Contractor will be paid liquidated damages in the amount per day set forth in the Supplementary Conditions to compensate Contractor for all damages resulting from any delay including but not limited to damages for general conditions costs, additional job site costs,

additional home office overhead costs, disruption costs, acceleration costs, increase in labor costs, increase in subcontract costs, increase in materials costs, and any other costs incident to the delay. Contractor will be entitled to no other compensation relating to the delay.

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

7.4 DOCUMENTATION OF CHANGES IN THE WORK

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

7.5 CHANGE ORDERS

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

7.6 CONSTRUCTION CHANGE DIRECTIVES

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

7.7 FIELD CHANGES

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

7.8 WAIVER OF CLAIMS

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

SECTION 8 - TIME

8.1 TIME IS OF THE ESSENCE

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

8.2 COMMENCEMENT OF THE WORK

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

8.3 DELAY IN COMPLETION OF THE WORK

- A. For each day after the expiration of the Contract Time that Contractor has not achieved Substantial Completion, Contractor will pay Owner the amount set forth in the Supplementary Conditions as liquidated damages for Owner's loss of use of the Project and the added administrative expense to Owner to administer the Project during the period of delay. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay. Owner may deduct any liquidated damages or reimbursable expenses from any money due or to become due to Contractor. If the amount of liquidated damages and reimbursable expenses exceeds any amounts due to Contractor, Contractor will pay the difference to Owner within ten (10) days after receipt of a written request from Owner for payment.
- B. At the time Architect certifies that Contractor has achieved Substantial Completion, Architect will identify the remaining items to be completed for final completion of the Work and will establish with Contractor a reasonable time for completion of those items. Architect will set forth the items to be completed and the time established for their completion in a Certificate of Substantial Completion. For each day that Contractor exceeds the time allowed for completion of the items set forth in the Certificate of Substantial Completion, Contractor will pay to Owner as liquidated damages for additional administrative expenses the amount set forth in the Supplementary Conditions. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay in completing such items.

SECTION 9 - PAYMENTS AND COMPLETION

9.1 SCHEDULE OF VALUES

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

9.2 PAYMENT REQUESTS

- A. Not more than once a month, Contractor will submit a payment request to Architect for Work completed, materials stored on the site, and for materials stored offsite as of the date of the payment request. The amount of the payment request will be based upon the schedule of values and will be equal to the value of the Work completed:
 - 1. Less retention;
 - 2. Less all prior amounts paid by Owner to Contractor as part of the Contract Sum; and
 - 3. Less allowable offsets.The payment request may include Changes in the Work that have been performed by Contractor and authorized by Owner and/or Architect pursuant to Section 7. If a payment request includes materials stored offsite, Contractor will include with the payment request a list of the materials, the location where they are stored and the written request of Contractor and its performance bond surety that payment be made for such materials.
- B. Contractor warrants and guarantees that upon the receipt of payment for materials and equipment, whether incorporated in the Project or not, title to such materials and equipment will pass to Owner free and clear of all liens, claims, security interests, or encumbrances. Notwithstanding this payment and passage of title, Contractor will remain responsible for all such materials and equipment until actual delivery to the project site, incorporation into the Work, and final acceptance by Owner. Contractor further warrants that no material or equipment covered by a payment request is subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or any other person or entity.

9.3 PAYMENT REQUEST CERTIFICATION

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

9.4 DECISIONS TO WITHHOLD CERTIFICATION AND PAYMENT

- A. Architect may withhold certification of a payment request in whole or in part to the extent reasonably necessary to protect Owner if, in the opinion of Architect, the representations to Owner required by Section 9.3, Paragraph B cannot be accurately made. If Architect is unable to certify payment in the amount of the payment request, Architect will notify Contractor and Owner as provided in Section 9.3, Paragraph A. If Contractor and Architect cannot agree on a revised amount, Architect will promptly certify a payment request for the amount for which Architect is able to make such representations to Owner. Architect may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a payment request previously certified, to such extent as may be necessary in Architect's opinion to protect Owner from loss because of:
 - 1. Defective work not remedied;
 - 2. Third-party claims filed or reasonable evidence indicating probable filing of such claims;
 - 3. Failure of Contractor to make payments properly to Subcontractors for labor, materials, equipment, construction or services;
 - 4. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
 - 5. Damage to Owner or another contractor for which Contractor is responsible;
 - 6. Reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance will not be adequate to cover the cost of completing the Work and damages for the anticipated delay; or
 - 7. Contractor's persistent failure to carry out the Work in accordance with the Contract Documents.
- B. Owner reserves the right to withhold payments to Contractor, subsequent to Architect's certification of any payment request, in order to protect Owner from loss due to any condition described in Section 9.4, Paragraph A, Subparagraphs 1 through 7. Upon satisfactory resolution of any such conditions, payments so withheld will be made.

9.5 PROGRESS PAYMENTS

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

9.6 FINAL PAYMENT

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

SECTION 10 - PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

10.2 SAFETY OF PERSONS AND PROPERTY

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

10.3 EMERGENCIES

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

10.4 HAZARDOUS MATERIALS

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

SECTION 11 - INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

- A. Contractor will obtain the following insurance and provide evidence thereof as described below prior to commencement of the Work or within ten (10) days after signing the Agreement, whichever is earlier:
 - 1. Workers Compensation Insurance.
 - 2. Employers Liability Insurance with minimum limits of the greater of \$500,000 E.L. each accident, \$500,000 E. L. disease- each employee, \$500,000 E.L. disease-policy limit or as required by the law of the state in which the Project is located.
 - 3. Commercial General Liability Insurance – ISO Form CG 00 01 (12/07) or equivalent Occurrence policy which will provide primary coverage to the additional insureds (the Owner and the Architect) in the event of any Occurrence, Claim, or Suit with:
 - a. Limits of the greater of Contractor's actual coverage amounts or the following:
 - 1) \$2,000,000 General Aggregate;
 - 2) \$2,000,000 Products - Comp/Ops Aggregate;
 - 3) \$1,000,000 Personal and Advertising Liability;
 - 4) \$1,000,000 Each Occurrence;
 - 5) \$50,000 Fire Damage to Rented Premises (Each Occurrence).
 - b. Endorsements attached to the General Liability policy including the following or their equivalent:
 - 1) ISO Form CG 25 03 (05/09), Amendment of Limits of Insurance (Designated Project or Premises), describing the Agreement and specifying limits as shown above.
 - 2) ISO Form CG 20 10 (07/04), Additional Insured -- Owners, Lessees, Or Contractors (Form B), naming Owner and Architect as additional insureds.
 - 4. Automobile Liability Insurance, with:
 - a. Combined Single Limit each accident in the amount of \$1,000,000 or Contractor's actual coverage, whichever is greater; and
 - b. Coverage applying to "Any Auto."
- B. Contractor will provide evidence of such insurance to Owner as follows:
 - 1. Deliver to Owner a Certificate of Liability Insurance, on ACORD 25 (2010/05) Form, or equivalent:
 - a. Listing Owner and its consultants as the Certificate Holders and Additional Insured on the general liability and any excess liability policies;
 - b. Attaching the ISO or equivalent endorsements set forth above to the Certificate of Liability Insurance;
 - c. Identifying the Project;
 - d. Listing the insurance companies providing coverage (All companies listed must be rated in A.M. Best Company Key Rating Guide-Property-Casualty and each company must have a rating of B+ Class VII or better. Companies which are not rated are not acceptable); and
 - e. Bearing the name, address and telephone number of the producer and signed by an authorized representative of the producer. The signature may be original, stamped, or electronic.
- C. Contractor will maintain, from commencement of the Work, Insurance coverage required herein as follows:
 - 1. Commercial General Liability Insurance through expiration of warranty period specified in Section 12.2, Paragraph B. including completion of any warranty repairs; and

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

11.2 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

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

SECTION 12 - UNCOVERING AND CORRECTION OF WORK

12.1 UNCOVERING OF WORK

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

12.2 CORRECTION OF WORK

- A. Contractor will promptly correct any portion of the Work that is rejected by Architect or which fails to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. Contractor will bear the cost of correcting such rejected Work, including additional testing and inspection costs, compensation for Architect's services, and any other expenses made necessary thereby.
- B. Contractor will remedy any defects due to faulty materials, equipment, or workmanship which appear within a period of one (1) year from the date of Substantial Completion or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents. Contractor will pay all costs of correcting faulty work, including without limitation additional Architect's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses when incurred.
- C. Nothing in the Contract Documents will be construed to establish a period of limitation within which Owner may enforce the obligation of Contractor to comply with the Contract Documents. The one-year period specified above has no relationship to the

time within which compliance with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations.

12.3 ACCEPTANCE OF NONCONFORMING WORK

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

SECTION 13 - RESOLUTION OF DISPUTES

13.1 SUBMITTAL OF DISPUTE

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

13.2 CONTRACTOR TO PROCEED WITH DILIGENCE

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

SECTION 14 - TERMINATION

14.1 TERMINATION BY CONTRACTOR

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

14.2 TERMINATION BY OWNER FOR CAUSE

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

14.3 TERMINATION BY OWNER FOR CONVENIENCE

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

SECTION 15 - MISCELLANEOUS PROVISIONS

15.1 GOVERNING LAW

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

15.2 NO WAIVER

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

15.3 RULE OF CONSTRUCTION

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

15.4 ENFORCEMENT

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

15.5 TESTS AND INSPECTIONS

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

END OF DOCUMENT

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SUPPLEMENTARY CONDITIONS

FIXED SUM (U.S.)

ITEM 1 - GENERAL

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

ITEM 2 - LIQUIDATED DAMAGE AMOUNTS:

1. The amount of liquidated damages to the benefit of the Contractor for delays under General Conditions Section 7.3, Paragraph B is \$500 per day.
2. The amount of liquidated damages to the benefit of the Owner for delays in Substantial Completion of the Work under General Conditions Section 8.3, Paragraph A is \$500 per day.
3. The amount of liquidated damages to the benefit of the Owner for delays in completing work itemized on the Substantial Completion Certificate under General Conditions Section 8.3, Paragraph B is \$250 per day.

ITEM 3 - PERMITS

1. Delete Section 3.6, Paragraph B of the General Conditions and replace with the following:
 - B. The amount of building and other permits will be issued by the Architect as an allowance and shall be included by the Bidders in their Bid Amount.

ITEM 4 - MISCELLANEOUS CHANGES IN GENERAL CONDITIONS

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

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

11.1 CONTRACTOR'S LIABILITY INSURANCE

- A. Contractor will obtain the following insurance and provide evidence thereof as described below prior to commencement of the Work or within ten (10) days after signing the Agreement, whichever is earlier:
 1. Workers Compensation Insurance.
 2. Employers Liability Insurance with minimum limits of the greater of: \$500,000 E.L. each accident, \$500,000 E. L. disease-each employee, \$500,000 E.L. disease-policy limit; or as required by the law of the state in which the Project is located.
 3. Commercial General Liability Insurance – ISO Form CG 00 01 (12/07) or equivalent Occurrence policy which will provide primary coverage to the additional insureds (the Owner and the Architect) in the event of any Occurrence, Claim, or Suit with:
 - a. Limits of the greater of: Contractor's actual coverage amounts or the following:
 - 1) \$2,000,000 General Aggregate;
 - 2) \$2,000,000 Products - Comp/Ops Aggregate;
 - 3) \$1,000,000 Personal and Advertising Injury;
 - 4) \$1,000,000 Each Occurrence;
 - 5) \$50,000 Damage to Rented Premises.
 - b. Endorsements attached to the General Liability policy including the following or their equivalent:
 - 1) ISO Form CG 25 03 (05/09), Designated Construction Project(s) General Aggregate Limit, describing the project and specifying that limits apply to each project of the contractor.
 - 2) ISO Form CG 20 10 (07/04), Additional Insured – Owners, Lessees or Contractors – Scheduled Person or Organization, naming Owner and Architect as additional insureds.
 4. Automobile Liability Insurance, with:
 - a. Combined Single Limit each accident in the amount of \$1,000,000 or Contractor's actual coverage, whichever is greater; and
 - b. Coverage applying to "Any Auto" or equivalent to all owned autos, hired autos, and non-owned autos.
 5. Builder's Risk Insurance Policy – ISO Form CP 00 20 (10/12), Builders Risk Coverage (or equivalent form) and ISO Form CP 10 30 (10/12) Causes of Loss – Special Form, and ISO Form CP 11 20 (06/07) Builders Risk – Collapse During Construction (or equivalent form) with Limits of Insurance in the amount of the Contract Sum.
 - a. Policy will cover materials stored at temporary storage locations and materials in transit.
 - b. Include Owner and Subcontractors as additional insureds.
 - c. Policy will be subject to a deductible of not less than \$5,000 per occurrence which will be the responsibility of Contractor and will not be included in the Cost of the Work or be a reimbursable

expense.

- B. Contractor will provide evidence of such insurance to Owner as follows:
1. Deliver to Owner a Certificate of Insurance on ACORD 25 (2010/05) or equivalent:
 - a. Listing Owner as the Certificate Holder and Owner and Architect as Additional Insureds on general liability and any excess liability policies;
 - b. Attaching the endorsements set forth above for additional insured on general liability (CG 20 10 07/04) and Designated Construction Project Aggregate Limit (CG 25 03 05/09).
 - c. Identifying the Project.
 - d. Listing the insurance companies providing coverage. All companies must be rated in A.M. Best Company's Key Rating Guide – Property-Casualty, current edition, at a rating B+ Class VII or better. Companies that are not rated are not acceptable.
 - e. Bearing the name, address, and telephone number of the producer and signed by an authorized representative of the producer. The signature may be original, stamped, or electronic. A faxed or digital copy is also acceptable.
 2. Deliver to Owner a Certificate of Insurance on ACORD 27, Evidence of Property Insurance, for the Builders Risk Insurance Policy attaching the endorsement giving evidence that the Owner and all Subcontractors are listed as additional insureds on the Builders Risk Policy.
- C. Contractor will maintain, from commencement of the Work, Insurance coverage required herein as follows:
1. Commercial General Liability Insurance through expiration of warranty period specified in Section 12.2, Paragraph B. including completion of any warranty repairs;
 2. Builders' Risk Insurance through Substantial Completion; and
 3. All other insurance through final payment.
- D. In the event of a loss, or upon request by Owner, Contractor will provide Owner with a copy of required insurance policies above.
- E. Owner reserves the right to reject any insurance company, policy, endorsement, or certificate of insurance with or without cause.
- F. Owner may, in writing and at its sole discretion, modify the insurance requirements.

ITEM 5 - STATE SPECIFIC SUPPLEMENTARY CONDITIONS

Utah

RETENTION APPLIED TO CONTRACTOR PAYMENTS FOR PROJECTS IN UTAH:

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

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

PAYMENT OF RETAINED FUNDS IN UTAH:

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

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

UTAH STATE SALES TAX:

Add the following to the General Conditions:

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

UTAH NOTICE OF INTENT TO OBTAIN FINAL COMPLETION:

Add the following to the General Conditions:

- A. Contractor will file with the State Construction Registry, on its own behalf and/or on behalf of

Owner, a notice of intent to obtain final completion at least 45 days before the day on which the Owner or Contractor files or could file a notice of completion under Utah Code Ann. Section 38-1a-506 if:

1. The completion of performance time under the original contract for construction work is greater than 120 days;
2. The total original construction contract price exceeds \$500,000; and
3. The original contractor or owner has not obtained a payment bond in accordance with Utah Code Ann. Section 14-2-1.

UTAH NOTICE OF COMPLETION:

Add the following to the General Conditions:

- A. Within five (5) calendar days of final completion of the Project and in compliance with Section 38-1a-507 Utah Code Annotated, Contractor will file with the State Construction Registry, and copy to Owner, a notice of completion which will include, without limitation, the following:
 1. The name, address, telephone number, and email address of the person filing the notice of completion;
 2. The name of the county in which the Project and/or Project site is located;
 3. The date on which final completion is alleged to have occurred;
 4. The method used to determine final completion; and
 5. One of the following:
 - a. The tax parcel identification number of each parcel included in the Project and/or Project site;
 - b. The entry number of a preliminary notice on the same project that includes the tax parcel identification number of each parcel included in the Project and/or Project site; or
 - c. The entry number of the building permit issued for the Project.
- B. Notwithstanding any other provision of the Contract Documents to the contrary, Contractor and Owner agree that any breach or failure to comply with this Section by the Contractor will constitute a breach of contract and the Contractor will be liable for any direct, indirect, or consequential damages to the Owner flowing from this breach.

UTAH PROGRESS PAYMENTS AND FINAL PAYMENT:

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

9.5 PROGRESS PAYMENTS

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

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

9.6 FINAL PAYMENT

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

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DIVISION 01: GENERAL REQUIREMENTS

01 1000 SUMMARY

- 01 1100 SUMMARY OF WORK
- 01 1200 MULTIPLE CONTRACT SUMMARY
- 01 1400 WORK RESTRICTIONS

01 2000 PRICE AND PAYMENT PROCEDURES

- 01 2100 ALLOWANCES
- 01 2900 PAYMENT PROCEDURES

01 3000 ADMINISTRATIVE REQUIREMENTS

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

01 4000 QUALITY REQUIREMENTS

- 01 4000 QUALITY REQUIREMENTS
- 01 4200 REFERENCES
- 01 4301 QUALITY ASSURANCE - QUALIFICATIONS
- 01 4523 TESTING AND INSPECTION SERVICES
- 01 4546 DUCT TESTING, ADJUSTING, AND BALANCING
- 01 4551 REFRIGERANT SYSTEM TESTING

01 5000 TEMPORARY FACILITIES AND CONTROLS

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

01 6000 PRODUCT REQUIREMENTS

- 01 6100 COMMON PRODUCT REQUIREMENTS
- 01 6200 PRODUCT OPTIONS
- 01 6400 OWNER-FURNISHED PRODUCTS
- 01 6600 PRODUCT DELIVERY, STORAGE, AND HANDLING REQUIREMENTS

01 7000 EXECUTION AND CLOSEOUT REQUIREMENTS

- 01 7100 EXAMINATION AND PREPARATION
- 01 7300 EXECUTION
- 01 7400 CLEANING AND WASTE MANAGEMENT
- 01 7700 CLOSEOUT PROCEDURES
- 01 7800 CLOSEOUT SUBMITTALS

END OF TABLE OF CONTENTS

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**SECTION 01 1100
SUMMARY OF WORK**

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

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

1.3 WORK BY OWNER

- A. Owner will furnish and install some portions of The Work with its own forces. Contractor will be provided with schedule of when these items are to be performed.
1. General:
 - a. Complete work necessary to accommodate work to be performed by Owner before scheduled date for performance of such work. Contractor will be back charged for actual expenses incurred by Owner for failure to timely complete such work.
 - b. Store and protect completed work provided by Owner until date of Substantial Completion.
 2. Work furnished and installed by Owner include, but are not limited to, following:
 - a. Selected Commercial Toilet Accessories.
 - b. Carpet and Carpet Base.
 - c. Building telephone / data system, paging system, sound system, and security system cables and terminations.

PART 2 - PRODUCTS Not Used**PART 3 - EXECUTION Not Used**

END OF SECTION

SECTION 01 1200
MULTIPLE CONTRACT SUMMARY

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 SUMMARY OF CONTRACTS

- A. Owner has issued or will issue separate contracts for operations scheduled to be completed between Notice to Proceed and Substantial Completion.
1. General:
 - a. Schedule performance of work covered by such separate contracts in Contractor's Construction Schedule so as to avoid delays in Substantial Completion. Give written notice to such contractors and to Owner of any revisions to scheduled delivery and work dates at least 90 days in advance.
 - b. Complete work necessary to accommodate items provided under such separate contracts before scheduled date for performance of such work. Contractor will be back charged for actual expenses incurred by Owner for failure to timely complete such work including, but not limited to, cost of crews during downtime or for call backs and costs to correct substrate deficiencies.
 - c. Store and protect completed work provided under separate contracts until date of Substantial Completion.
 2. Building telephone / data system, paging system, sound system, and security system cables and terminations.
 3. Projection Screens. See Section 11 5213.
 4. Sheet Carpeting. See Section 09 6816.
 5. Testing and Inspection. See Section 01 4523 "Testing and Inspection" for testing and inspection, and testing laboratory services for materials, products, and construction methods:
 - a. Aggregate Base. See Section 31 1123.
 - b. Air System Testing, Adjusting, and Balance. See Section 01 4546.
 - c. Concrete. See Section 03 3111.
 - d. Concrete Moisture Vapor Emission and Alkalinity level. See Section 09 0503, Section 09 6466, Section 09 6519, and Section 09 6567.
 - e. Drill-In Mechanical Anchors / Adhesive Anchors / Screw Anchors. See Section 03 1511 and Section 04 0519.
 - f. Fill / Engineering Fill. See Section 31 2323.
 - g. Headed Concrete Anchor Studs / Deformed Bar Anchors. See Section 03 1511.
 - h. Masonry (Structural). Tests and inspections are required as specified in Sections under Heading 04 2000 'Unit Masonry'. For administrative requirements, see Section 04 0501 'Common Masonry Requirements'.
 - i. Reinforcement Bars. See Section 03 2100.
 - j. Structural Steel Framing. See Section 05 1200.
 6. Tile Carpeting. See Section 09 6813.

PART 2 - PRODUCTS Not Used**PART 3 - EXECUTION Not Used**

END OF SECTION

**SECTION 01 1400
WORK RESTRICTIONS**

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 PROJECT CONDITIONS

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

PART 2 - PRODUCTS Not Used**PART 3 - EXECUTION Not Used**

END OF SECTION

**SECTION 01 2100
ALLOWANCES****PART 1 - GENERAL****1.1 SUMMARY**

A. Section Includes But is Not Limited To:

1. Administrative and procedural requirements to prepare and process Allowances.

1.2 CASH ALLOWANCES

A. Allowances with be issued by Addendum.

B. If actual purchase price differs from Allowance, change order will be issued adjusting Contract Sum by amount of difference.

C. Actual purchase price is actual amount paid by Contractor, including applicable sales and use taxes, before taking into account cash discounts for prompt payment.

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

**SECTION 01 2900
PAYMENT PROCEDURES**

PART 1 - GENERAL**1.1 SUMMARY**

A. Section Includes But is Not Limited To:

1. Administrative and procedural requirements to prepare and process Applications for Payments.

1.2 PAYMENT REQUESTS

A. Use Payment Request forms provided by Owner.

B. Each Payment Request will be consistent with previous requests and payments certified by Architect and paid for by Owner.

C. Request Preparation:

1. Complete every entry on Payment Request form.
2. Entries will match data on approved schedule of values and Contractor's Construction Schedule.
Use updated schedules if revisions have been made.
3. Submit signed Payment Request to Architect with current Construction Schedule.

D. Provide following submittals before or with submittal of Initial Payment Request:

1. List of Subcontractors.
2. Initial progress report.
3. Contractor's Construction Schedule.
4. Submittal Schedule.

E. Provide Affidavit of Contractor and Consent of Surety with Payment Request following Substantial Completion.

1.3 SCHEDULE OF VALUES

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

1. Contractor's Construction Schedule.
2. Payment Request form.
3. Schedule of Allowances.
4. Schedule of Alternates.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

SECTION 01 3100
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 PROJECT COORDINATION

- A. Project designation for this Project is LDS# 527-5822-WEC18503.
- B. This Project designation will be included on documents generated for Project by Contractor and Subcontractors, or be present on a cover letter accompanying such documents.

1.3 MULTIPLE CONTRACT COORDINATION

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

1.4 PROJECT MEETINGS AND CONFERENCES

- A. Preconstruction Conference:
 - 1. Attend preconstruction conference and organizational meeting scheduled by Architect at Project site or other convenient location.
 - 2. Be prepared to discuss items of significance that could affect progress, including such topics as:
 - a. Construction schedule.
 - b. Critical Work sequencing.
 - c. Current problems.
 - d. Designation of responsible personnel.
 - e. Distribution of Contract Documents.
 - f. Equipment deliveries and priorities.
 - g. General schedule of inspections by Architect and its consultants.
 - h. General inspection of tests.
 - i. Office, work, and storage areas.
 - j. Preparation of record documents and O & M manuals.
 - k. Procedures for processing interpretations and Modifications.
 - l. Procedures for processing Payment Requests.
 - m. Project cleanup.
 - n. Security.
 - o. Status of permits.
 - p. Submittal of Product Data, Shop Drawings, Samples, Quality Assurance / Control submittals.
 - q. Use of the premises.
 - r. Work restrictions.
 - s. Working hours.
 - 3. Architect will record minutes of meetings and distribute copies to Owner and Contractor within three (3) working days.
- B. Progress Meetings:
 - 1. Attend progress meetings at Project site at regularly scheduled intervals determined by Architect, at least once a month.
 - 2. Progress meetings will be open to Owner, Architect, Subcontractors, and anyone invited by Owner, Architect, and Contractor.
 - 3. Be prepared to discuss items of significance that could affect progress, including following:
 - a. Progress since last meeting.
 - b. Whether Contractor is on schedule.
 - c. Activities required to complete Project within Contract Time.
 - d. Labor and materials provided under separate contracts.
 - e. Off-site fabrication problems.
 - f. Access.
 - g. Site use.
 - h. Temporary facilities and services.
 - i. Hours of work.

- j. Hazards and risks.
 - k. Project cleanup.
 - l. Quality and Work standards.
 - m. Status of pending modifications.
 - n. Documentation of information for Payment Requests.
 - o. Maintenance of Project records.
4. Architect will prepare minutes of progress meetings and distribute copies of minutes to Owner and Contractor within three (3) working days.
- C. Pre-Installation Conferences:
- 1. Attend pre-installation conferences specified in Contract Document.
 - a. If possible, schedule these conferences on same day as regularly scheduled Progress Meetings. If this is not possible, coordinate scheduling with Architect.
 - b. Request input from attendees in preparing agenda.
 - 2. Be prepared to discuss following items:
 - a. Requirements of Contract Documents.
 - b. Completed work necessary for installation of items or systems.
 - c. Conditions not in compliance with installation requirements.
 - d. Installation and inspection schedule.
 - e. Coordination between trades.
 - f. Space and access limitations.
 - g. Testing.
 - 3. Architect will prepare meeting minutes and distribute minutes to Owner and Contractor within three (3) working days.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

SECTION 01 3200
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL**1.1 SUMMARY****A. Section Includes But is Not Limited To:**

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

1.2 SCHEDULING OF WORK**A. Bar Chart Schedule:**

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

B. Daily Construction Reports:

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

C. Construction Digital Photographs:

1. Project superintendent shall have on project a digital camera during entire construction period.
2. Digital photographs shall be taken during entire construction period and include at least:
 - a. All underground trench and utility piping.
 - b. Footing forming and steel placement.
 - c. Concrete slab placement.
 - d. All framing stages.
 - e. At end of framing after rough electrical, plumbing, and just prior to placement of insulation and gypsum board.
 - f. Roof sheathing and nailing prior to roofing.
 - g. Landscaping trenches and pipe placement.

D. Plumbing Videos:

1. Video under-slab plumbing after installed and covered, but before slab is installed.
2. Video entire underground plumbing to main sewer connection after project is complete, but prior to substantial completion.
3. Provide CD copy of videos to Architect with O & M Manuals.

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

**SECTION 01 3300
SUBMITTAL PROCEDURES**

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 SUBMITTAL SCHEDULE

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

1.3 SUBMITTAL PROCEDURES

- A. Coordination:
 - 1. Coordinate preparation and processing of submittals with construction activities. Transmit each submittal sufficiently before performance of related construction activities to avoid delay.
 - a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - b. Coordinate transmittal of different types of submittals required for related elements of The Work so processing will not be delayed by need to review submittals concurrently for coordination. Architect reserves right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
 - 2. Processing Time:
 - a. Allow sufficient review time so installation will not be delayed by time required to process submittals, including time for resubmittals.
 - 1) Allow 21 days for initial review. Allow additional time if processing must be delayed allowing coordination with subsequent submittals. Architect will promptly advise Contractor when submittal being processed must be delayed for coordination.
 - 2) If an intermediate submittal is necessary, process same as initial submittal.
 - 3) Allow 10 days for reprocessing each submittal.
 - 4) No extension of Contract Time will be authorized because of failure to transmit submittals to Architect in sufficient time before work is to be performed to allow processing.
 - 3. Identification:
 - a. Place permanent label or title block on each submittal for identification. Include name of entity that prepared each submittal on label or title block.
 - 1) Provide space approximately 4 by 5 inches on label or beside title block on Shop Drawings to record Contractor's review and approval markings and action taken.
 - 2) Include following information on label for processing and recording action taken:
 - a) Project name.
 - b) Date.
 - c) Name and address of Architect.
 - d) Name and address of Contractor.
 - e) Name and address of Subcontractor.
 - f) Name and address of supplier.
 - g) Name of manufacturer.

- h) Number and title of appropriate Specification Section.
 - i) Drawing number and detail references, as appropriate.
- 4. Transmittal:
 - a. Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using transmittal letter. On transmittal, record relevant information and requests for data. Include Contractor's certification that information complies with Contract Document requirements, or, on form or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations.
 - b. Submittals received from sources other than Contractor or not marked with Contractor's approval will be returned without action.

1.4 ACTION SUBMITTALS

- A. Product Data:
 - 1. Submit Product Data, as required by individual Sections of Specifications.
 - 2. Mark each copy of each set of submittals to show choices and options used on Project. Where printed Product Data includes information on products that are not required for Project, mark copies to indicate information relating to Project.
 - 3. Certify that proposed product complies with requirements of Contract Documents. List any deviations from those requirements on form or separate sheet.
 - 4. Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required.
 - 5. Submit electronic files PDF: Architect will return a PDF copy marked with action taken and with corrections or modifications required.
- B. Shop Drawings:
 - 1. Submit newly prepared graphic data to accurate scale. Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 36 by 48 inches. Highlight, encircle, or otherwise show deviations from Contract Documents. Include following information as a minimum:
 - a. Dimensions.
 - b. Identification of products and materials included.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - 2. Do not reproduce Contract Documents or copy standard information as basis of Shop Drawings. Standard printed information prepared without specific reference to Project is not acceptable as Shop Drawings.
 - 3. Review and designate (stamp) approval of shop drawings. Unless otherwise specified, submit to Architect six copies of shop drawings required by Contract Documents. Shop drawings not required by Contract Documents, but requested by Contractor or supplied by Subcontractor, need not be submitted to Architect for review.
- C. Samples:
 - 1. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
 - a. Mount, display, or package Samples to ease review of qualities specified. Prepare Samples to match samples provided by Architect, if applicable. Include following:
 - 1) Generic description of Sample.
 - 2) Sample source.
 - 3) Product name or name of manufacturer.
 - 4) Compliance with recognized standards.
 - 5) Availability and delivery time.
 - 2. Submit Samples for review of kind, color, pattern, and texture, for final check of these characteristics with other elements, and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 - a. Where variations in color, pattern, texture or other characteristics are inherent in material or product represented, submit set of three samples minimum that show approximate limits of variations.
 - b. Refer to other specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.

- c. Refer to other Sections for Samples to be returned to Contractor for incorporation into The Work. Such Samples shall be undamaged at time of use. On transmittal, indicate special requests regarding disposition of Sample submittals.
3. Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit full set of choices for material or product. Preliminary submittals will be reviewed and returned with Architect's mark indicating selection and other action.
4. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit three sets. One will be returned marked with action taken.
5. Samples, as accepted and returned by Architect, will be used for quality comparisons throughout course of construction.
 - a. Unless noncompliance with Contract Documents is observed, submittal may serve as final submittal.
 - b. Sample sets may be used to obtain final acceptance of construction associated with each set.

1.5 INFORMATIONAL SUBMITTALS

- A. Informational submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports, and other documentary data affirming quality of products and installations. Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required. [or] Submit electronic files: PDF. Architect will return a PDF copy marked with action taken and with corrections or modifications required.
 1. Certificates: Describe certificates intended to document affirmations by Contractor or others that the work is in accordance with the Contract Documents, but do not repeat provisions of Parts 2 or 3.
 2. Delegated Design Submittals / Design Data: Describe submittals intended to demonstrate design work prepared by Contractor's licensed professionals.
 3. Test And Evaluation Reports: Describe submittal of test reports or evaluation service reports intended to document required tests.
 4. Manufacturer Instructions: Describe submittals intended to document manufacturer instructions.
 5. Source Quality Control Submittals: Describe submittal of source quality control documentation.
 6. Field Quality Control Submittals: Describe submittal of field quality control documentation.
 7. Manufacturer Reports: Describe submittal of Manufacturer reports as documentation of manufacturer activities.
 8. Special Procedure Submittals: Describe submittals intended to document special procedures. An example would be construction staging or phasing for remodeling an existing facility while keeping it in operation. While the Contractor would normally be responsible for managing this, submittal of his plan as documentation could be specified.
 9. Qualification Statements: Describe submittals intended to document qualifications of entities employed by Contractor.

1.6 CLOSEOUT SUBMITTALS

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

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. This title groups maintenance material required submittals specific to the Section. Items may be provided at completion of Work or submitted with section 01 7800 Closeout Submittals:
 1. Spare Parts: Describe spare parts necessary for Owner's use in facility operation and maintenance. 'Parts' are generally understood to be items such as filters, motor drive belts, lamps, and other similar manufactured items that require only simple replacement.

2. Extra Stock Materials: Describe extra stock materials to be provided for Owner's use in facility operation and maintenance. Extra stock materials are generally understood to be items such as ceiling tiles, flooring, paint etc.
3. Tools:
 - a. Describe tools to be provided for Owner's use in facility operation and maintenance. Tools are generally understood to be wrenches, gauges, circuit setters, etc, required for proper operation or maintenance of a system.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

**SECTION 01 3500
SPECIAL PROCEDURES**

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 REFERENCES

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

1.3 ADMINISTRATIVE REQUIREMENTS

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

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
1. Meet regulations of 29 CFR 1926 OSHA, 'Construction Industry Regulations'.
 2. Owner's Safety Requirements:
 - a. Personal Protection:
 - 1) Contractor shall ensure:
 - a) Positive means of fall protection, such as guardrails system, safety net system, personal fall arrest system, etc, is provided to employees whenever exposed to a fall 6 feet or more above a lower level.
 - b) Personnel working on Project shall wear hard hats and safety glasses as required by regulation and hazard.
 - c) Personnel working on Project shall wear long or short sleeve shirts, long pants, and hard-toed boots or other sturdy shoes appropriate to type and phase of work being performed.
 - b. Contractor Tools And Equipment:
 - 1) Contractor shall ensure:
 - a) Tools and equipment are in good working condition, well maintained, and have necessary guards in place.
 - b) Ground Fault Circuit Interrupters (GFCI) is utilized on power cords and tools.
 - c) Scaffolding and man lifts are in good working condition, erected and maintained as required by governmental regulations.
 - d) Ladders are in good condition, well maintained, used as specified by Manufacturer, and secured as required.
 - c. Miscellaneous:
 - 1) Contractor shall ensure:
 - a) Protection is provided on protruding rebar and other similar objects.
 - b) General Contractor Superintendent has completed the OSHA 10-hour construction outreach training course or equivalent.
 - c) Implementation and administration of safety program on Project.
 - d) Material Safety Data Sheets (MSDS) are provided for substances or materials for which an MSDS is required by governmental regulations before bringing on site.
 - e) Consistent safety training is provided to employees on Project.
 - f) Implement and coordinate Lockout / Tagout procedures with Owner's Representative as required.

- 2) Report accidents involving injury to employees on Project that require off-site medical treatment to Owner's designated representative.
- d. Hot Work Permit:
 - 1) Permit shall document that fire prevention and protection requirements in 29 CFR 1926.352, 'Fire Prevention' have been implemented prior to beginning hot work operations.
 - 2) Required for doing hot work involving open flames or producing heat or sparks such as:
 - a) Brazing.
 - b) Cutting.
 - c) Grinding.
 - d) Soldering.
 - e) Thawing pipe.
 - f) Torch applied roofing.
 - g) Welding.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

**SECTION 01 4000
QUALITY REQUIREMENTS**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

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

1.3 REFERENCES

- A. Definitions:
 - 1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
 - 2. Approved: To authorize, endorse, validate, confirm, or agree to.
 - 3. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with requirements indicated; and having complied with requirements of authorities having jurisdiction.
 - 4. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a construction operation, including installation, erection, application, and similar operations.
 - a. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of corresponding generic name.
 - 5. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish standard by which the Work will be judged.
 - 6. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
 - 7. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
 - 8. Product Testing: Tests and inspections that are performed by testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
 - 9. Service Provider: Agency or firm qualified to perform required tests and inspections.
 - 10. Source Quality Control Testing: Tests and inspections that are performed at source, i.e., plant, mill, factory, or shop.
 - 11. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
 - 12. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.

13. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.

B. Reference Standards:

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

1.4 ADMINISTRATIVE REQUIREMENTS

A. Conflicting Requirements:

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

B. Coordination:

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

C. Scheduling:

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

1.5 QUALITY ASSURANCE

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

1. Specific quality assurance and quality control requirements for individual construction activities are specified in Sections that specify those activities and Section 01 4523. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality control procedures that facilitate compliance with Contract Document requirements.
3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

B. Quality Assurance Services:

1. Activities, actions, and procedures performed before and during execution of the Work to verify compliance and guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
2. Owner or Owner's designated representative(s) will perform quality assurance to verify compliance with Contract Documents.

C. Activities performed by Owner's Quality Assurance Testing Agency include, but are not limited to following:

1. Individual Sections in Division 01 through Division 49:
 - a. Pre-Installation Conference agenda review items for:
 - 1) Schedule requirements.
 - 2) Testing and inspection requirements:
 - 3) Requirements and frequency of testing and inspections.
 - 4) Mock-up or sample requirements.
 - 5) Submittals requirements.
 - b. Quality Assurance personal qualifications.
 - 1) Qualification documentation including certificates if required.
 - c. Non-Conforming Work:
 - 1) Prepare non-compliance log to track non-compliant testing or inspections.
2. Weekly Activities:
 - a. Summarize and track any non-compliance issues.
 - b. Provide summary report of previous week's performed Work.

- c. Visit contractors periodically to find out if they have any concerns with Quality Assurance inspectors and check on any schedule changes.
 - d. Visit Owner's Representatives periodically to find out if they have any concerns with how project is progressing.
 - D. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with following requirements, using materials indicated for completed Work:
 - 1. Coordinate with individual section in Division 01 through Division 49 if there are any additional requirements or modification to these requirements:
 - a. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - b. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - c. Demonstrate proposed range of aesthetic effects and workmanship.
 - d. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - 1) Allow seven days for initial review and each re-review of each mockup.
 - e. Maintain mockups during construction in undisturbed condition as standard for judging completed Work.
 - 1) Demolish and remove mockups when directed, unless otherwise indicated.

1.6 QUALITY CONTROL

- A. Quality Control Services:
 - 1. Quality Control will be sole responsibility of Contractor.
 - a. Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements performed by Contractor:
 - 1) They do not include inspections, tests or related actions performed by Architect, Owner, governing authorities or independent agencies hired by Owner or Architect.
 - 2) Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - b. Where services are indicated as Contractor's responsibility, engage a qualified Testing Agency to perform these quality control services.
 - 1) Contractor shall not employ same testing entity engaged by Owner, without Owner's written approval.
- B. Manufacturer's Field Services: Where indicated, engage factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300: 'Submittal Procedures'.
- C. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify Testing Agency sufficiently in advance of operations to permit assignment of personnel. Provide following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist Testing Agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require quality control by Testing Agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections:
 - 1. Civil And Structural Testing:
 - a. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services'. Quality Control is sole responsibility of Contractor:
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
 - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
 - 2) Contractor bears full responsible for compliance with all contract requirements and quality control on project and will be responsible for quality of asphalt mixture and asphalt installation.

b. Weekly Activities:

- 1) Ensure that non-compliance log is current.
- 2) Provide summary reports of performed Work.

PART 2 - PRODUCTS Not Used**PART 3 - EXECUTION****3.1 REPAIR AND PROTECTION**

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

END OF SECTION

**SECTION 01 4200
REFERENCES****PART 1 - GENERAL****1.1 SUMMARY****A. Section Includes But is Not Limited To:**

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

1.2 REFERENCES**A. Definitions:**

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

B. References Standards:

1. Specification Format: Specifications will follow MasterFormat™ 2004 for organizing numbers and titles. (The Construction Specifications Institute, Project Resource Manual/CSI Manual of Practice, 5th Edition. New York, McGraw-Hill, 2005).
 - a. Specification Identifications:
 - 1) The Specifications use section numbers and titles to help cross referencing in the Contract Documents.
 - 2) Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.
 - b. Specification Language:
 - 1) Specifications should be prepared, with concern and respect for their legal status. Specifications should be Clear, Concise, Correct and Complete.

- 2) Streamlining: Streamlining is used to list products, materials, reference standards, and other itemized specifications. This technique places the subject first and provides keywords for quick reference
- c. Sentence Structure:
 - 1) Specifications to be written in the "Imperative Mood".
 - a) The verb that clearly defines the action becomes the first word in the sentence.
 - b) The imperative sentence is concise and readily understandable.
 - 2) Streamlining is used to list products, materials, reference standards, and other itemized specifications. This technique places the subject first and provides keywords for quick reference.
- d. Abbreviated Language:
 - 1) Abbreviations should be used only on drawings and schedules where space is limited.
 - 2) Abbreviations with multiple meanings should be avoided, unless used in different disciplines where their meaning is clear from the context in which they are used.
 - 3) Abbreviations should be limited to five or fewer letters
 - a) The verb that clearly defines the action becomes the first word in the sentence.
- e. Symbols:
 - 1) Caution should apply to symbols substituted for words or terms.
- f. Numbers:
 - 1) The use of Arabic numerals rather than words for numbers is recommended.
- C. Industry Standards:
 1. Except where Contract Documents specify otherwise, construction industry standards will apply and are made a part of Contract Documents by reference.
 2. Where compliance with two or more standards is specified and standards apparently establish different or conflicting requirements for minimum quantities or quality levels, refer to Architect for decision before proceeding. Quantity or quality level shown or specified will be minimum provided or performed. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for context of requirements. Refer uncertainties to Architect for decision before proceeding.
 3. Each entity engaged in construction on Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with Contract Documents. Where copies of standards are needed for performance of a required construction activity, Contractor will obtain copies directly from publication source.
 4. Trade Association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean association names. Names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.

AABC	Associated Air Balance Council	Washington	DC	(202) 737-0202	www.aabchq.com
AAMA	American Architectural Manufacturers Association	Schaumburg	IL	(847) 303-5664	www.aamanet.org
AASHTO	American Association of State Highway & Transportation Officials	Washington	DC	(202) 624-5800	www.aashto.org
AAMA	American Architectural Manufacturers Association	Schaumburg	IL	(847) 303-5774	www.aamanet.org
AASHTO	American association of State Highways and Transportation Officials	Washington	DC		www.transportation.org www.aashto.org
ACI	American Concrete Institute International	Farmington Hills	MI	(248) 848-3700	www.aci-int.org
AGA	American Gas Association	Washington	DC	(202) 824-7000	www.aga.org
AHRI	Air Conditioning Heating & Refrigeration Institute	Arlington	VA	(703) 524-8800	www.ari.org
AIA	American Institution of Architects	Washington	DC	(202) 626-7300	www.aia.org

AISC	American Institute of Steel Construction	Chicago	IL	(312) 670-2400	www.aisc.org
AISI	American Iron & Steel Institute	Washington	DC	(202) 452-7100	www.steel.org
AITC	American Institution of Timber Construction	Englewood	CO	(303) 792-9559	www.aitc-glulam.org
AMCA	Air Movement & Control Association International	Arlington Heights	IL	(847) 394-0150	www.amca.org
ANSI	American National Standards Institute	New York	NY	(212) 642-4900	www.ansi.org
APA	APA-Engineered Wood Association	Tacoma	WA	(253) 565-6600	www.apawood.org
API	American Petroleum Institute	Washington	DC	(202) 682-8000	www.api.org
AQMD	South Coast Air Quality Management District	Diamond Bar	CA	(909) 396-2000	www.aqmd.gov
ASHRAE	American Society of Heating, Refrigerating, & Air-Conditioning Engineers	Atlanta	GA	(404) 636-8400	www.ashrae.org
ASME	American Society of Mechanical Engineers International	New York	NY	(800) 843-2763	www.asme.org
ASTM	ASTM International	West Conshohocken	PA	(610) 832-9500	www.astm.org
AWI	Architectural Woodwork Institute	Potomac Falls	VA	(571) 323-3636	www.awinet.org
AWPA	American Wood Protection Association	Birmingham	AL	(205) 733-4077	www.awpa.com
AWS	American Welding Society	Miami	FL	(800) 443-9353	www.aws.org
AWWA	American Water Works Assoc	Denver	CO	(303) 794-7711	www.awwa.org
BHMA	Builders Hardware Manufacturers Association	New York	NY	(212) 297-2122	www.buildershardware.com
BIA	Brick Industry Association	Reston	VA	(703) 620-0010	www.bia.org
CFI	International Certified Floor-covering Installers, Inc.	Kansas City	MO	(816) 231-4646	www.cfi-installers.org
CRI	Carpet & Rug Institution	Dalton	GA	(706) 278-3176	www.carpet-rug.com
CRSI	Concrete Reinforcing Steel Institute	Schaumburg	IL	(847) 517-1200	www.crsi.org
CISPI	Cast Iron Soil Pipe Institute	Chattanooga	TN	(423) 892-0137	www.cispi.org
DHI	Door & Hardware Institute	Chantilly	VA	(703) 222-2010	www.dhi.org
DIPRA	Ductile Iron Pipe Research Association.	Birmingham	AL	(205) 402-8700	www.dipra.org
EIMA	EIFS Industry Members Association	Morrow	GA	(800) 294-3462	www.eima.com
FM	FM Global	Johnston	RI	(401) 275-3000	www.fmglobal.com
FSC	Forest Stewardship Council	Bonn, Germany		+49 (0) 228 367 66 0	www.fsc.org
GA	Gypsum Association	Hyattsville	MD	(301) 277-8686	www.gypsum.org
GS	Green Seal	Washington	DC	(202) 872-6400	www.greenseal.org
HPVA	Hardwood Plywood & Veneer Association	Reston	VA	(703) 435-2900	www.hpva.org
ICC	International Code Council	Washington	DC	(888) 422-7233	www.iccsafe.org
ICC-ES	ICC Evaluation Service	Whittier	CA	(562) 699-0543	www.icc-es.org
ICBO	International Conference of Building Officials				(See ICC)
ISO	International Organization for Standardization	Geneva, Switzerland			www.iso.org

ISSA	International Slurry Surfacing Association	Annapolis	MD	(410) 267-0023	www.slurry.org
KCMA	Kitchen Cabinet Manufacturers Association	Reston	VA	(703) 264-1690	www.kcma.org
LPI	Lightning Protection Institute	Maryville	MO	(800) 488-6864	www.lightning.org
MFMA	Maple Flooring Manufacturers' Association	Deerfield	IL	(888) 480-9138	www.maplefloor.org
MSS	Manufacturer's Standardization Society of The Valve and Fittings Industry	Vienna	VA	(703) 281-6613	www.mss-hq.com
NAAMM	National Association of Architectural Metal Manufacturers	Glen Ellyn	IL	(630) 942-6591	www.naamm.org
NEC	National Electric Code	(from NFPA).			
NEMA	National Electrical Manufacturer's Association	Rosslyn	VA	(703) 841-3200	www.nema.org
NFPA	National Fire Protection Association	Quincy	MA	(800) 344-3555	www.nfpa.org
NFRC	National Fenestration Rating Council	Greenbelt	MD	(301) 589-1776	www.nfrc.org
NSF	NSF International	Ann Arbor	MI	(734) 769-8010	www.nsf.org
PCA	Portland Cement Association	Skokie	IL	(847) 966-6200	www.cement.org
PCI	Precast / Prestressed Concrete Institute	Chicago	IL	(312) 786-0300	www.pci.org
PEI	Porcelain Enamel Institute	Norcross	GA	(770) 676-9366	www.porcelainenamel.com
RFCI	Resilient Floor Covering Institute	LaGrange	GA	(706) 882-3833	www.rfci.com
SCTE	Society of Cable Telecommunications Engineers	Exton	PA	(800) 542-5040	www.scte.org
SDI	Steel Deck Institute	Fox River Grove	IL	(847) 458-4647	www.sdi.org
SDI	Steel Door Institute	Westlake	OH	(440) 899-0010	www.steeldoor.org
SIGMA	Sealed Insulating Glass Manufacturer's Association	Chicago	IL	(312) 644-6610	www.arcat.com
SJI	Steel Joist Institute	Myrtle Beach	SC	(843) 293-1995	www.steeljoist.org
SMACNA	Sheet Metal & Air Conditioning Contractors National Association	Chantilly	VA	(703) 803-2980	www.smacna.org
SPIB	Southern Pine Inspection Bureau	Pensacola	FL	(850) 434-2611	www.spib.org
SSMA	Steel Stud Manufacturer's Association	Glen Ellyn	IL	(630) 942-6592	www.ssma.com
TCNA	Tile Council of North America	Anderson	SC	(864) 646-8453	www.tileusa.com
TPI	Truss Plate Institute	Alexandria	VA	(703) 683-1010	www.tpinst.org
TPI	Turfgrass Producers International (formally American Sod Producers Association)	East Dundee	IL	(847) 649-5555	www.turfgrasssod.org
UL	Underwriters Laboratories	Camas	WA	(877) 854-3577	www.ul.com
WDMA	Window and Door Manufacturer's Association	Chicago	IL	(312) 321-6802	www.nwwda.org
WWPA	Western Wood Products Association	Portland	OR	(503) 224-3930	www.wwpa.org

D. Federal Government Agencies:

- Names and titles of federal government standard or specification producing agencies are often abbreviated. Following acronyms or abbreviations referenced in Contract Documents represent names of standard or specification producing agencies of federal government. Names and

addresses are subject to change but are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.

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

E. Governing Regulations / Authorities:

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

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

SECTION 01 4301
QUALITY ASSURANCE - QUALIFICATIONS

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 REFERENCES

- A. Definitions:
 - 1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
 - 2. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
 - 3. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
 - 4. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM E329-14a, 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.'

1.3 QUALIFICATIONS

- A. Qualifications: Qualifications paragraphs in this Article establish minimum qualification levels required; individual Specification Sections specify additional requirements:
 - 1. Fabricator / Supplier / Installer Qualifications: Firm experienced in producing products similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units.
 - a. VMR (Value Managed Relationship):
 - 1) Where heading '*VMR (Value Managed Relationship) / Manufacturers / Suppliers / Installers*' is used to identify list of specified suppliers or installers, Owner has established relationships that extend beyond requirements of this Project.
 - 2) No other *Suppliers / Installers* will be acceptable.
 - 3) Follow specified procedures to preserve relationships between Owner and specified suppliers / installers and advantages that accrue to Owner from those relationships.
 - 4) Following areas of the Work have restrictions on sub-bids by Contractor:
 - a) Aluminum-Framed Entrances And Storefronts, Section 08 4113: VMR, no other Manufacturer / Installers accepted.
 - b) Common Finish Hardware Requirements, Section 08 7101: VMR Supplier, no other Supplier accepted:
 - (1) Accessories, Section 08 7109.
 - (2) Accessories for Pairs of Doors, Section 08 7105.
 - (3) Closing Devices, Section 08 7106.
 - (4) Hanging Devices, Section 08 7102.
 - (5) Operating Trim, Section 08 7104.
 - (6) Protective Plates and Trim, Section 08 7107.
 - (7) Securing Devices, Section 08 7103.
 - (8) Stops and Holders, Section 08 7108.
 - c) Flush Wood Doors: Factory Finished, Clear, Section 08 1429: VMR Supplier, no other Supplier accepted.
 - d) Hollow Metal Frames, Section 08 1213: VMR Supplier, no other Supplier accepted.
 - e) Hollow Metal Doors, Section 08 1313: VMR Supplier, no other Supplier accepted.

- f) Polyvinyl-Chloride Roofing: PVC, Section 07 5419: VMR, no other Manufacturer / Installers accepted.
 - g) Sheet Carpeting, Section 09 6816: VMR, no other Manufacturer / Installers accepted.
- b. Approved:
 - 1) Where heading '*Approved Suppliers / Distributors / Installers / Applicators / Fabricators*' is used to identify list of specified suppliers / distributors / installers / applicators / fabricators, use only listed suppliers / installers / fabricators.
 - 2) No substitutions will be allowed.
 - 3) Following areas of the Work have restrictions on sub-bids by which may be accepted by Contractor:
 - a) Audio Systems, Section 27 5117: Alternate Installers approved by Owner before bidding.
 - b) Ceramic Tiling, Section 09 3013: No other Suppliers accepted.
 - c) Electrical, Division 26: Installers approved by Architect before bidding.
 - d) Electric And Electronic Control System for HVAC, Section 23 0933, No other Distributors accepted.
 - e) HVAC, Division 23: Installers approved by Architect before bidding.
 - f) Painting And Coating, Sections Under 09 9000 heading of Table of Contents: Applicators approved by Architect before bidding.
 - g) Plumbing, Division 22: Installers approved by Architect before bidding.
 - h) Seamless Flooring System, Section 09 6724: Applicator approved by Manufacturer before installation.
- c. Acceptable Suppliers / Installers:
 - 1) Where heading '*Acceptable Suppliers / Installers / Fabricators*' is used, qualifications as specified in Quality Assurance in Part 1 of individual sections will be used to determine requirements of those that will be acceptable to be used on Project. Lists for acceptable installers can include additional installers that may be approved before bidding or by addendum.
 - a) Underground Sprinklers, Section 32 8423: Acceptable Landscape Installers approved by Landscape Architect before bidding. Equal Landscape Installers to be approved by Architect before bidding.
- 2. Factory-Authorized Service Representative Qualifications:
 - a. Authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- 3. Installer Qualifications:
 - a. Firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- 4. Manufacturer Qualifications:
 - a. Firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- 5. Manufacturer's Field Services Qualifications:
 - a. Experienced authorized representative of manufacturer to inspect field-assembled components and equipment installation, including service connections.
- 6. Professional Engineer Qualifications:
 - a. Professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- 7. Specialists:
 - a. Certain sections of Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations.
 - b. Specialists shall satisfy qualification requirements indicated and shall be engaged for activities indicated.
 - c. Requirement for specialists shall not supersede building codes and regulations governing the Work.

8. Testing Agency Qualifications:
 - a. Independent Testing Agency with experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1) Testing Laboratory:
 - a) AASHTO Materials Reference Laboratory (AMRL) Accreditation Program.
 - b) Cement and Concrete Reference Laboratory (CCRL).
 - c) Nationally Recognized Testing Laboratory (NRTL): Nationally recognized testing laboratory according to 29 CFR 1910.7.
 - d) National Voluntary Laboratory (NVLAP): Testing Agency accredited according to National Institute of Standards and Technology (NIST) Technology Administration, U. S. Department of Commerce Accreditation Program.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

SECTION 01 4523
TESTING AND INSPECTING SERVICES

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

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

1.3 REFERENCES

- A. Association Publications:
 - 1. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15th St., NW, Washington, DC 20005; 202-347-7474; www.acec.org).
 - 2. International Code Council (IBC):
 - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.
- B. Definitions:
 - 1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
 - 2. Approved: To authorize, endorse, validate, confirm, or agree to.
 - 3. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.
 - 4. Inspection/Special Inspection:
 - a. Inspection: Not required by code provisions but may be required by Contract Documents.
 - b. Special Inspection: Inspection required of materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and reference standards (required by code provisions and by Contract Documents).
 - c. Special Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
 - d. Special Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.
 - 5. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation. They are not samples. Approved mockups establish standard by which the Work will be judged.
 - 6. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
 - 7. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

8. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
 9. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
 10. Special Inspection: See Inspection.
 11. Special Inspector: Certified individual or firm that implements special inspection program for project.
 12. Special Test: See Test.
 13. Test/Special Test: Field or laboratory tests to determine characteristics and quality of building materials and workmanship:
 - a. Test: Not required by code provisions but may be required by Contract Documents.
 - b. Special Test: Required by code provisions and by Contract Documents.
 14. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
 15. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
 16. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.
- C. Reference Standards:
1. ASTM International:
 - a. ASTM A898/A898M-17, 'Standard Specification for Straight Beam Ultrasonic Examination of Rolled Steel Structural Shapes'.
 - b. ASTM C42/C42M-16, 'Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete'.
 - c. ASTM C138/C138M-17a, 'Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete'.
 - d. ASTM C597-16, 'Standard Test Method for Pulse Velocity Through Concrete'.
 - e. ASTM C803/C803M-17, 'Standard Test Method for Penetration Resistance of Hardened Concrete'.
 - f. ASTM C805/C805M-13a, 'Standard Test Method for Rebound Number of Hardened Concrete'.
 - g. ASTM C1019-16, 'Standard Test Method for Sampling and Testing Grout'.
 - h. ASTM C1021-08(2014), 'Standard Practice for Laboratories Engaged in Testing of Building Sealants'.
 - i. ASTM C1077-16a, 'Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation'.
 - j. ASTM C1093-15a, 'Standard Practice for Accreditation of Testing Agencies for Masonry'.
 - k. ASTM D3666-16, 'Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials'.
 - l. ASTM D3740-12a, 'Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction'.
 - m. ASTM E114-15, 'Standard Practice for Ultrasonic Pulse-Echo Straight-Beam Examination by the Contact Method'.
 - n. ASTM E164-13, 'Standard Practice for Contact Ultrasonic Testing of Weldments'.
 - o. ASTM E329-14a: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
 - p. ASTM E488-15, 'Standard Test Methods for Strength of Anchors in Concrete Elements'.
 - q. ASTM E543-15, 'Standard Specification for Agencies Performing Nondestructive Testing'.
 - r. ASTM E587-15, 'Standard Practice for Ultrasonic Angle-Beam Examination by the Contact Method'.
 - s. ASTM E709-15, 'Standard Guide for Magnetic Particle Testing'.
 - t. ASTM E1212-17, 'Standard Practice for Quality Management Systems for Nondestructive Testing Agencies'.
 - u. ASTM F710-11, 'Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring'.
 - v. ASTM F2170-16b, 'Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes'.
 2. Code of Federal Regulations:
 - a. 29 CFR 1910, Subpart A, Section 1910.7, 'Definition and Requirements for a Nationally Recognized Testing Laboratory'.

3. International Code Council (IBC 2015 or latest approved edition):
 - a. IBC Chapter 17, 'Special Inspections And Tests'.
 - 1) Section 1704, 'Special Inspections And Tests, Contractor Responsibility And Structural Observations'.
 - 2) Section 1705, 'Required Special Inspection And Tests'.
 - a) Section 1705.2, 'Steel Construction'.

1.4 SUBMITTALS

- A. Informational Submittals:
 1. General: Additional submittal requirements are specified in Individual Sections in Division 01 through Division 50.
 2. Certificates:
 - a. Testing Agency will submit certified written report of each inspection, test, or similar service.
 3. Tests and Evaluation Reports:
 - a. Testing Agency or Agencies will prepare logs, test reports, and certificates applicable to specific tests and inspections and deliver copies (or electronic record) distributed as follows:
 - 1) 1 copy to Owner's Representative.
 - 2) 1 copy to Architect.
 - 3) 1 copy to Consulting Engineers (Engineer of Record).
 - 4) 1 copy to General Contractor.
 - 5) 1 copy to Authorities Having Jurisdiction (if required).
 - b. Other tests, certificates, and similar documents will be obtained by Contractor and delivered to Owner's Representative and Architect in such time as not to delay progress of the Work or final payment therefore.
 - c. Submittal Format:
 - 1) Schedule of Tests and Inspections: Prepare in tabular form and include following:
 - a) Specification Section number and title.
 - b) Description of test and inspection.
 - c) Identification of applicable standards.
 - d) Identification of test and inspection methods.
 - e) Number of tests and inspections required.
 - f) Time schedule or time span for tests and inspections.
 - g) Entity responsible for performing tests and inspections.
 - h) Requirements for obtaining samples.
 - 2) Certified written reports of each inspection, test, or similar service will include, but not be limited:
 - a) Date of issue.
 - b) Project title and number.
 - c) Name, address, and telephone number of Testing Agency.
 - d) Dates and locations of samples and tests or inspections.
 - e) Names of individuals making tests and inspections.
 - f) Description of the Work and test and inspection method.
 - g) Identification of product and Specification Section.
 - h) Complete test or inspection data.
 - i) Test and inspection results and an interpretation of test results.
 - j) Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - k) Comments or professional opinion on whether tested or inspected Work complies with Contract Document requirements.
 - l) Name and signature of laboratory inspector.
 - m) Recommendations on retesting and re-inspecting.
 4. Source Quality Control Submittals:
 - a. Testing Agency will submit following prior to commencing the Work:
 - 1) Qualifications of Testing Agency management and personnel designated to project.
 - 2) Testing Agency 'Written Practice for Quality Assurance'.
 - 3) Qualification records for Inspector and non-destructive testing technicians designated for project.
 - 4) Testing Agency non-destructive testing procedures, equipment calibration records, and personnel training records.
 - 5) Testing Agency Quality Control Plan for monitoring and control of testing operations.
 - 6) Welding Inspection Procedures (Structural Steel testing).

- 7) Bolting Inspection Procedures (Structural Steel testing).
- 8) Shear Connector Stud Inspection Procedures (Structural Steel testing).
- 9) Seismic Connections Inspection Procedures (Structural Steel testing).

1.5 QUALITY ASSURANCE

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

1.6 QUALITY CONTROL

- A. Quality Control will be sole responsibility of Contractor. Contractor will be responsible for testing and inspections, coordination, start-up, operational checkout, and commissioning of all items of the Work included in Project. All costs for these services will be included in Contractor's cost of the Work.
- B. Contractor will assign one (1) employee to be responsible for Quality Control. This individual may have other responsibilities and may be Contractor's Project superintendent or Contractor's Project Manager.
- C. Notify results of all Testing and Inspection performed by Contractor's independent Testing Agencies to Architect and Owner's Representative within twenty four (24) hours of test or inspection having been performed.
 1. Testing and Inspection Reports will be distributed as follows:
 - a. 1 copy to Owner's Representative.
 - b. 1 copy to Architect.
 - c. 1 copy to Consulting Engineer(s) (Engineer of Record).
 - d. 1 copy to Authorities Having Jurisdiction (if required).
- D. Contractor's Responsibility:
 1. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents.
 2. Tests and inspections that are not explicitly assigned to Owner are responsibility of Contractor.
 3. Cooperate with Testing Agency(s) performing required inspections, tests, and similar services and provide reasonable auxiliary services as requested. Notify Testing Agency before operations to allow assignment of personnel. Auxiliary services required include but are not limited to:
 - a. Providing access to the Work and furnishing incidental labor, equipment, and facilities deemed necessary by Testing Agency to facilitate inspections and tests at no additional cost to Owner.
 - b. Taking adequate quantities of representative samples of materials that require testing or helping Testing Agency in taking samples.
 - c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
 - d. Providing Testing Agency with preliminary design mix proposed for use for materials mixes that require control by Testing Agency.
 4. Contractor will integrate Owner's independent Testing Agency services within Baseline Project Schedule and with other Project activities.
 5. For any requested inspection, Contractor will complete prior inspections to ensure that items are ready for inspection.

6. All Work is subject to testing and inspection and verification of correct operation prior to 100% payment to Contractor of line item(s) pertaining to that aspect of the Work.
7. For Mechanical Equipment, inspection and documented approval of individual equipment and/or system(s) must be accomplished prior to requesting Substantial Completion Inspection for any area affected by said equipment and/or system:
 - a. Contractor will perform thorough checkout of operations with manufacturer's representatives prior to requesting formal inspection by Owner.
 - b. Contractor must notify Owner's Representative, in advance, as to when manufacturer's representative is scheduled to arrive at Site.
8. Comply:
 - a. Upon completion of Testing Agency's inspection, testing, sample-taking, and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes.
 - b. Comply with Contract Documents in making such repairs.
9. Data: Furnish records, drawings, certificates, and similar data as may be required by testing and inspection personnel to assure compliance with Contract Documents.
10. Defective Work (Non-Conforming Work): Non-conforming Work as covered in General Conditions applies, but is not limited to following requirements:
 - a. Where results of inspections, tests, or similar services show that the Work does not comply with Contract Document requirements, correct deficiencies in the Work promptly to avoid Work delays.
 - b. Where testing personnel take cores or cut-outs to verify compliance, repair prior to acceptance.
 - c. Contractor responsible for any and all costs incurred resulting from inspection that was scheduled prematurely or retesting due to failed tests.
 - d. Remove and replace any Work found defective or not complying with contract document requirements at no additional cost to Owner.
 - e. Should test return unacceptable results, Contractor will bear all costs of retesting and re-inspection as well as cost of all material consumed by testing, and replacement of unsatisfactory material and/or workmanship.
11. Protection:
 - a. Protect construction exposed by or for quality assurance and quality control service activities, and protect repaired construction.
12. Scheduling: Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities:
 - a. Schedule testing and inspections in advance so as not to delay the Work and to eliminate any need to uncover Work for testing or inspection.
 - b. Notify Testing Agency and Architect as noted in Sections in Division 01 through Division 50 prior to any time required for such services.
 - c. Incorporate adequate time for performance of all inspections and correction of noted deficiencies.
 - d. Schedule sequence of activities to accommodate required services with minimum of delay.
 - e. Schedule sequence of activities to avoid necessity of removing and replacing construction to accommodate testing and inspections
13. Test and Inspection Log:
 - a. Provide system of tracking all field reports, describing items noted, and resolution of each item. Prepare record of tests and inspections. Include following:
 - 1) Date test or inspection was conducted.
 - 2) Description of the Work tested or inspected.
 - 3) Date test or inspection results were transmitted to Architect.
 - 4) Identification of Testing Agency or inspector conducting test or inspection.
 - b. Maintain log at Project site:
 - 1) Post changes and modifications as they occur.
 - 2) Provide access to test and inspection log for Architect's reference during normal working hours.

1.7 TESTING AND INSPECTIONS - GENERAL

- A. Testing specifically identified to be conducted by Owner, will be performed by an independent entity and will be arranged and paid for by Owner.
- B. Individual Sections in Division 01 through Division 49 indicate if Owner will provide testing and inspection of the Work of that Section.

- C. Tests include but not limited to those described in detail in 'Field Quality Control' in Part 3 of Individual Sections in Divisions 01 through Division 49.
- D. Owner may engage additional consultants for testing, air balancing, commissioning, or other special services:
 - 1. Activities of any such Owner consultants are in addition to Contractor testing of materials or systems necessary to prove that performance is in compliance with Contract requirements.
 - 2. Contractor must cooperate with persons and firms engaged in these activities.
- E. Taking Specimens:
 - 1. Except as may be specifically otherwise approved by Architect, only testing laboratory shall secure, handle, transport, or store any samples and specimens for testing.
- F. Scheduling Testing Agency:
 - 1. Contractor will coordinate the Work and facilitate timeliness of such testing and inspecting services so as not to delay the Work.
 - 2. Contractor will notify Testing Agency and Architect to schedule tests and / or inspections.
- G. For 'building-wide' and/or life safety systems, such as emergency lighting, emergency power uninterruptible power supply systems, fire alarm, fire sprinkler systems, smoke evacuation systems, toxic gas monitoring, capturer exhaust systems, etc. formal start-up inspection will be completed prior to requesting Substantial Completion Inspection for any area of Project:
 - 1. Manufacturer's representatives and installing contractor will demonstrate both operation and compliance to Owner's agents and consultants. If coordinated and scheduled appropriately by Contractor, these equipment and/or systems inspections may also serve to provide required Owner training, if approved in advance by Owner.
 - 2. Contractor responsible for requesting that Architect arrange for inspection of materials, equipment, and work prior to assembly or enclosure that would make materials, equipment, or work inaccessible for inspection and at other times as may be required.

1.8 TESTING AGENCY SERVICES AND RESPONSIBILITIES

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

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

1.9 ARCHITECT'S RESPONSIBILITIES

A. Architect Duties:

1. Notify Owner's Representative before each test and/or inspection.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

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

END OF SECTION

SECTION 01 4546
DUCT TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Is Not Limited To:
 - 1. Test, balance, and adjust air duct systems services provided by Owner as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 2. Division 23:
 - a. Completing installation and start-up of mechanical systems, and changing sheaves, belts, and dampers as required for correct balance.
 - b. Maintain HVAC system and equipment in full operation each working day of testing, balancing, and adjusting.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Assisting Testing Agency in testing and balancing of mechanical system.
- B. Scheduling:
 - 1. Schedule this work in cooperation with other Sections involved and to comply with completion date for test, balance, and adjust air duct systems as described in Contract Documents.
 - 2. Contact Testing Agency and coordinate:
 - a. One inspection when 60 percent of ductwork is installed.
 - b. One inspection when 90 percent of equipment and ductwork is installed.
 - 3. Contact Testing Agency and coordinate date(s) for test and balance work when following is completed:
 - a. HVAC and exhaust systems including installation of specialties, devices, and new filters.
 - b. Proper function of control system components including electrical interlocks, damper sequences, air and water reset, and fire and freeze stats has been verified.
 - c. Automatic temperature controls have been calibrated and set for design operating conditions.
 - d. Verification of proper thermostat calibration and setting of control components such as static pressure controllers and other devices that may need set points changed during process of balancing system.
 - 4. If, in opinion of Testing Agency, systems are not ready for test and balance, reschedule as required.

1.3 SUBMITTALS

- A. Informational Submittals:
 - 1. Test and Evaluation Reports:
 - a. Preliminary Report(s):
 - 1) Four copies to be given to Owner's Representative.
 - b. Final Report :
 - 1) Four copies to be given to Owner's Representative.
- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Testing and Inspection Reports:
 - a) Testing Agency Testing and Evaluation Final Report of testing, balancing, and adjusting air duct systems. Bind approved copy of Testing and Evaluation Report in Operations And Maintenance Manual for Division 23.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Approved Testing Agency. Section 01 4301 applies, but is not limited to following:
 - a. Testing Agency shall specialize in testing and balancing of heating, ventilating, and cooling systems to balance, adjust, and test air moving equipment, air distribution, and exhaust systems.
 - b. Testing Agency shall provide proof of having successfully completed at least five years of specialized experience in air and hydronic system balancing.
 - c. Testing Agency shall provide testing under direct supervision of qualified heating and ventilating engineer.

- d. Neither Architect's engineering consultant nor anyone performing work on this Project under other Sections of Division 23 shall be permitted to do this work.

PART 2 - PRODUCTS: Not Used**PART 3 - EXECUTION****3.1 FIELD QUALITY CONTROL****A. Field Tests****1. Air System Testing, Adjusting, And Balance:**

- a. Inspections and site visits. (For paragraph a thru c, note deficiencies, if any, that needs to be corrected and report this to Owner's Representative, Architect, and Mechanical Engineer):
- 1) One inspection when ductwork installation is 60 percent complete.
 - 2) One inspection when ductwork is installation is 90 percent complete.
 - 3) One inspection when potable hot and cold water system is 90 percent complete.
 - 4) Site visit for test and balance. Before commencing test and balance, perform an inspection to verify 100 percent completion of system. Confirm completion of work, correction of previously noted deficiencies, and look for new deficiencies not noted in previous inspections. If the work is complete, then proceed with test and balance. If the work is not complete and ready for test and balance, inform Contractor and submit an invoice to Owner's Representative for compensation for travel time, expenses, and time on site. Report deficiencies or incomplete work to Owner's Representative, Architect, and Mechanical Engineer.
 - 5) Additional site visits (beyond those set forth above) to complete the work after issues are resolved may be needed and will be paid for separately from compensation for services set forth in this Agreement, pursuant to hourly rates and conditions set forth in Attachment "A".
- b. Checklist for Inspections and site visits:
- 1) Pre-Startup Inspection – use for inspections and site visits a thru d in paragraph 1 above. All pertinent items shall be checked, including but not limited to following:
 - a) Removal of shipping blocks and stops.
 - b) Vibration isolators' alignment and adjustment.
 - c) Flexible connections properly installed and aligned.
 - d) Safety controls, safety valves and high or low limits in operation.
 - e) All systems properly filled.
 - f) Filters in place and seal provided around edges.
 - g) Filters and strainers are clean.
 - h) Fire damper installation and operation, and access door installation.
 - i) Installation of all gauges on equipment.
 - j) Control system is operating.
 - k) All dampers, valves, and operators are properly installed and operating.
 - l) All ductwork is installed and sealed.
 - m) Voltage to unit matches nameplate voltage.
 - 2) First Run Inspection – use for inspections and site visits d and e in paragraph 1 above. Recheck items in Pre-Startup list, and check for following items:
 - a) Excessive vibration or noise.
 - b) Loose components.
 - c) Initial control settings.
 - d) Motor amperages.
 - e) Heat buildup in motors.
 - f) Control system is calibrated and functioning as required.
 - 3) System Operation Inspection – use for inspections and site visits d and e in paragraph 1 above. Observe mechanical systems under operation for sufficient amount of time to ensure proper operation in all running modes. Check following items periodically.
 - a) Filters and strainers.
 - b) Filters and strainers.
 - c) Check for system leaks at seals and valves.
- c. Performance Requirements:
- 1) Testing and balancing in complete accordance with Associated Air Balance Council (AABC) Standards for Field Measurement & Instructions, Form P1266, Volume I.
- d. Site tests: Air Test and Balancing Procedure:
- 1) Instruments used by Consultant shall be accurately calibrated and maintained in good working order.

- 2) All supply air and return air fans in all HVAC zone systems, energy recovery ventilators, and exhaust fans in building shall be operating when final setup of all units is performed.
- 3) Perform tests at high and low speeds of multi-speed systems and single speed systems.
- 4) Perform following testing and balancing functions in accordance with Associated Air Balance Council National Standards.
 - a) Fan Speeds - Air handling units (with variable pitch pulleys and sheaves): Test and adjust fan RPM to achieve design CFM requirements.
 - b) Fan Speeds - Furnaces (with direct drive motors): Set fan speed to lowest possible setting that will achieve design CFM requirements. Adjust down from Contractor setting, if necessary. Adjust low voltage fan speed jumpers (provided and installed by installing contractor) as necessary to achieve design cooling air flow at lowest possible setting. An exception to this would be when furnace is variable speed blower for dehumidification applications.
 - c) Current And Voltage: Measure and record motor current and voltage.
 - d) Pitot-Tube Traverse Method:
 - (1) Make measurements in duct where velocity is uniform, 7-1/2 duct diameters downstream and 2 duct diameters minimum upstream from any turbulence, i.e., elbow, damper, take-off, etc.
 - (2) Perform pitot-tube traverse of outdoor ventilation air duct serving each piece of air moving equipment.
 - (3) Where single outdoor ventilation air trunk duct serves multiple pieces of equipment, perform pitot-tube traverse of duct branch serving each piece of equipment as well as pitot-tube traverse of total air flow in trunk with all pieces of equipment operating.
 - e) Where pitot-tube traverse is not possible or if pitot-tube traverse is unreliable, flow hood measurement over exterior intake louver or grille is acceptable for measuring outdoor ventilation air.
 - f) Use proportionate method of air balance leaving fan at lowest possible speed and at least one branch balance damper fully open.
- 5) Static Pressure: Test and record system static pressures, including suction and discharge static pressure of each fan.
- 6) Air Temperature: Take dry bulb air temperatures on entering and leaving side of each cooling coil. Dry bulb temperatures shall be taken on entering and leaving side of each heating unit.
- 7) Zone Ducts: Adjust zone ducts to within design CFM requirements. At least one zone balancing damper shall be completely open.
- 8) Branch Ducts: Adjust branch ducts to within design CFM requirements. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.
- 9) Tolerances: Test and balance all fans, zone ducts, registers, diffusers etc. to + or – 10 percent of design CFM.
- 10) Identification: Identify location and area of each grille, diffuser, register, and terminal box. Record on air outlet data sheets.
- 11) Description: Record size, type, and manufacturer of each diffuser, grille, and register on air outlet data sheets.
- 12) Drafts: Adjust diffusers, grilles, and registers to minimize drafts. For high sidewall supply air diffusers install horizontal blade core to direct air flow upward 15 degree and set adjustable vertical blades to spread air flow horizontally and evenly in fan pattern.
- 13) Permanently mark all outside air, supply air, and return air damper positions after balancing has been completed.
- 14) Smoke testing: Smoke testing, or some other approved means, may be required to determine leak locations if air balance report indicates that any system's CFM total is less than 90 percent of design CFM. Prior to test, verify that system's duct joints have been sealed as specified and that air moving device in question is supplying required design system air flow. Mechanical Engineer will approve test method required. If smoke test is selected, use following procedure. Provide necessary precautions to protect those performing or observing test from being exposed to smoke.
 - a) Use zinc chloride smoke candles, titanium tetrachloride ampules or sticks, or other devices acceptable to Mechanical engineer to generate smoke.

- b) Close openings in duct except for one opening at farthest end of duct run.
- c) Circulate smoke at pressurized condition of 1/2 inch minimum water gauge static pressure.
- d) Report findings to mechanical engineer in writing.
- e. Air System Test and Evaluation Report:
 - 1) Record test data on AABC standard forms or facsimile.
 - 2) Preliminary Report: Provide and deliver four copies of complete data for evaluation and approval to Owner.
 - 3) Final report: Provide and deliver complete four copies of final report to Owner prior to project Substantial Completion date.
 - 4) Complete with logs, data, and records as required herein. Print logs, data, and records on white bond paper bound together in report form.
 - 5) Certified accurate and complete by Consultant's certified test and balance engineer.
 - 6) Contain following general data in format selected by Consultant:
 - a) Project Number.
 - b) Project Title.
 - c) Project Location.
 - d) Project Architect and Mechanical Engineer.
 - e) Consultant and Certified Engineer.
 - f) Contractor and mechanical sub-contractor.
 - g) Dates tests were performed.
 - h) Certification Document.
 - i) Report Forms similar to AABC Standard format.
 - 7) Report shall include following:
 - a) Instrumentation List including type, model, manufacturer, serial number, and calibration dates.
 - b) HVAC zone identification to include reduced ductwork floor plan from project documents with outlets and inlets numbered to match written test and balance report. This page may be oversized but it should fold up neatly within standard 8 1/2 x 11 report paper size.
 - c) Record following for each piece of air handling equipment:
 - (1) Manufacturer, model number, and serial number.
 - (2) Design and manufacture rated data.
 - (3) Actual CFM.
 - (4) Suction and discharge static pressure of each fan.
 - (5) Outdoor-ventilation-air and return-air total CFM.
 - (6) Final RPM of each motor or speed tap.
 - (7) Actual operating current and voltage of each fan motor.
 - (8) Fan and motor sheave manufacturer, model, size, number of grooves and center distance.
 - (9) Belt size and quantity.

3.2 PREPARATION

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

END OF SECTION

**SECTION 01 4551
REFRIGERATION SYSTEM TESTING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Testing operation of refrigeration systems.
- B. Related Sections:
 - 1. Sections of Division 23: Repairs and adjustments to refrigeration systems, as required for proper operation.

1.2 SUBMITTALS

- A. Quality Assurance / Control: Before Substantial Completion inspection, submit four copies of complete test data for evaluation and approval.
- B. Closeout: Submit copy of approved final test report for inclusion in Operations And Maintenance Manual.

1.3 QUALITY ASSURANCE

- A. Qualifications: Testing personnel may be employees of Air Balance and Testing Agency or separate independent agency. Neither Architect's engineer nor anyone performing work under other Sections of Division 23 shall be permitted to do this work.

1.4 SEQUENCING

- A. Perform refrigeration system testing at same time as air system testing. After air system balancing has been completed, record refrigeration system testing data at same time as final air balance data is recorded, to insure correlation of all system data.

PART 2 - PRODUCTS: Not Used**PART 3 - EXECUTION**

- A. Procedure:
 - 1. Inspect refrigeration lines and connections for evidence of leaks.
 - 2. Check liquid line sight glasses for bubbles.
 - 3. Check to make certain that bottom coil on air handler is first coil to be activated.
 - 4. Check to make certain that compressor time delay on restart occurs after thermostat shuts off compressor, not when thermostat first calls for cooling.
 - 5. Test and record the following for each system:
 - a. Air temperature entering condenser coil.
 - b. Air temperature entering evaporator coil.
 - c. Air temperature leaving evaporator coil.
 - d. Refrigerant suction temperature at evaporator coil.
 - e. Refrigerant suction temperature and pressure at condensing unit.
 - f. Refrigerant liquid line pressure at condensing unit.
 - g. Fuse or circuit breaker size and type.
 - h. Rated and actual full load current and voltage at condensing unit.

END OF SECTION

**SECTION 01 5100
TEMPORARY UTILITIES**

PART 1 - GENERAL**1.1 SUMMARY**

A. Section Includes But is Not Limited To:

1. Administrative and procedural requirements for Temporary Utilities.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Where necessary, engage appropriate local utility companies to install temporary service or connect to existing service. Where utility company provides only part of service, provide remainder with matching, compatible materials and equipment. Comply with utility company's recommendations.

1. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction.
2. Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.
3. Arrange with utility company and existing users for time when service can be interrupted, where necessary, to make connections for temporary services.
4. Provide adequate capacity at each stage of construction. Before temporary utility availability, provide trucked-in services.
5. Obtain construction easements necessary to bring temporary and/or permanent utilities to site.
6. Use qualified personnel for installation and maintenance of temporary facilities. Locate temporary utilities where they will serve Project adequately and result in minimum interference with the Work of Owner or other Contractors on Project Site. Relocate and modify temporary utilities as required.
7. Pay cost and use charges for temporary and permanent utilities until Substantial Completion has been granted by Owner.

B. Prepare schedule indicating dates for implementation and termination of each temporary utility. At earliest feasible time, change over from use of temporary service to use of permanent service.

C. Keep temporary utilities clean and neat in appearance. Operate in safe and efficient manner. Take necessary fire prevention measures. Do not overload utilities, or allow them to interfere with progress of The Work. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on Project site.

D. Limit availability of temporary utilities to essential and intended uses to reduce waste and abuse.

E. Maintain temporary utilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.
2. Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

F. Remove each temporary utility and control when need has ended, or when replaced by permanent utility, but not later than Substantial Completion. Complete permanent construction that may have been delayed because of interference with temporary utility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

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

1.3 TEMPORARY ELECTRIC POWER

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

1.4 TEMPORARY FIRE PROTECTION

A. Install and maintain temporary fire protection facilities of types needed to protect against predictable and controllable fire losses. At a minimum, provide and maintain in working order two Standard UL Labeled ABC all-purpose 10 lb fire extinguishers. Do not incorporate these extinguishers into final Project.

1. Store combustible materials in containers in fire-safe locations.
2. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires.

3. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
4. At earliest feasible date in each area of Project, complete installation of permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

1.5 HEATING, COOLING, AND VENTILATING:

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

1.6 TEMPORARY LIGHTING

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

1.7 TEMPORARY TELEPHONES

- A. Provide temporary telephone service for all personnel engaged in construction activities, throughout construction period.
- B. Contractor will pay for Local calls. Party making call will pay for long-distance and toll calls.
- C. At each telephone, post list of important telephone numbers.

1.8 TEMPORARY WATER SERVICE

- A. Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

**SECTION 01 5200
CONSTRUCTION FACILITIES**

PART 1 - GENERAL**1.1 SUMMARY**

A. Section Includes But is Not Limited To:

1. Administrative and procedural requirements for Construction Facilities.

1.2 ADMINISTRATIVE REQUIREMENTS

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

1.3 FIELD OFFICES

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

1.4 SANITARY FACILITIES

- A. Provide temporary sanitary toilet. Service and maintain temporary toilet in a clean, sanitary condition.

PART 2 - PRODUCTS Not Used**PART 3 - EXECUTION Not Used**

END OF SECTION

**SECTION 01 5400
CONSTRUCTION AIDS**

PART 1 - GENERAL**1.1 SUMMARY**

A. Section Includes But is Not Limited To:

1. Administrative and procedural requirements for Construction Aids.

1.2 SCAFFOLDING, PLATFORMS, STAIRS, ETC

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

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

SECTION 01 5600
TEMPORARY BARRIERS AND ENCLOSURES

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 ADMINISTRATIVE REQUIREMENTS

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

1.3 TEMPORARY BARRICADES

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

1.4 TEMPORARY FENCING

- A. Before construction begins, install 6 foot high enclosure fence with lockable entrance gates. Locate where shown on Drawings. If not shown on Drawings, enclose entire site or portion sufficient to accommodate construction operations.

1.5 TEMPORARY SECURITY BARRIERS

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

1.6 TEMPORARY TREE AND PLANT PROTECTION

- A. Protection:
 - 1. Before commencing site work, build and maintain protective fencing around existing trees and vegetation as shown on the drawings.
 - 2. Individual trees will have protective fencing built beyond drip line.
 - 3. Build protective fencing around groups of trees and other vegetation as indicated on Drawings.
 - 4. Keep areas within protective fencing undisturbed and do not use for any purpose.

PART 2 - PRODUCTS Not Used**PART 3 - EXECUTION Not Used**

END OF SECTION

**SECTION 01 5700
TEMPORARY CONTROLS**

PART 1 - GENERAL**1.1 SUMMARY**

A. Section Includes But is Not Limited To:

1. Administrative and procedural requirements for Temporary Controls.

1.2 TEMPORARY EROSION AND SEDIMENT CONTROL

- A. Take precautions necessary to prevent erosion and transportation of soil downstream, to adjacent properties, and into on-site or off-site drainage systems.
- B. Develop, install, and maintain an erosion control plan if required by law.
- C. Repair and correct damage caused by erosion.

1.3 TEMPORARY ENVIRONMENTAL CONTROLS

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

PART 2 - PRODUCTS Not Used**PART 3 - EXECUTION Not Used**

END OF SECTION

**SECTION 01 5800
PROJECT IDENTIFICATION**

PART 1 - GENERAL**1.1 SUMMARY**

A. Section Includes But is Not Limited To:

1. Administrative and procedural requirements for Project Identification.

1.2 TEMPORARY PROJECT SIGNAGE

A. Contractor will erect a temporary project identification sign.

1. Sign may be free-standing or attached to temporary field office or storage shed. No other signs or advertisements are allowed on building site.
2. Owner reserves right to remove and/or take possession of any project identification sign.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

**SECTION 01 6100
COMMON PRODUCT REQUIREMENTS**

PART 1 - GENERAL**1.1 SUMMARY**

A. Section Includes But is Not Limited To:

1. Administrative and procedural requirements for Common Product Requirements.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Provide products that comply with Contract Documents, that are undamaged, and, unless otherwise indicated, new and unused at time of installation. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and for intended use and effect.
- B. Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on surfaces of products that will be exposed to view in occupied spaces or on building exterior.
1. Locate required product labels and stamps on concealed surface or, where required for observation after installation, on accessible surface that is not conspicuous.
 2. Provide permanent nameplates on items of service-connected or power-operated equipment. Locate on easily accessible surface that is inconspicuous in occupied spaces. Nameplate will contain following information and other essential operating data:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
- C. Where specifications describe a product or assembly by specifying exact characteristics required, with or without use of brand or trade name, provide product or assembly that provides specified characteristics and otherwise complies with Contract requirements.
- D. Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by manufacturer for application described. General overall performance of product is implied where product is specified for specific application. Manufacturer's recommendations may be contained in published product literature, or by manufacturer's certification of performance.
- E. Where specifications only require compliance with an imposed code, standard, or regulation, select product that complies with standards, codes or regulations specified.
- F. Where Specifications require matching an established Sample, Architect's decision will be final on whether proposed product matches satisfactorily. Where no product available within specified category matches satisfactorily nor complies with other specified requirements, refer to Architect.
- G. Where specified product requirements include phrase *' . . . as selected from manufacturer's standard colors, patterns, textures . . . '* or similar phrase, select product and manufacturer that comply with other specified requirements. Architect will select color, pattern, and texture from product line selected.
- H. Refer to individual Specification Sections and Allowance provisions in Division 01 for allowances that control product selection, and for procedures required for processing such selections.
- I. Remove and replace products and materials not specified in Contract Documents but installed in the Work with specified products and materials at no additional cost to Owner and for no increase in Contract time.
- J. Informational Submittals:
1. Sustainable Design Submittals:
 - a. Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required.
 - b. Submit electronic files: PDF. Architect will return a PDF copy marked with action taken and with corrections or modifications required.

PART 2 - PRODUCTS Not Used**PART 3 - EXECUTION Not Used**

END OF SECTION

**SECTION 01 6200
PRODUCT OPTIONS**

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Product Selection:
1. When option of selecting between two or more products is given, product selected will be compatible with products previously selected, even if previously selected products were also options.
- B. Non-Conforming Work:
1. Non-conforming work as covered in Article 12.3 of General Conditions applies, but is not limited, to use of non-specified products or manufacturers.
- C. Product selection is governed by Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include:
1. Substitutions And Equal Products:
 - a. Generally speaking, substitutions for specified products and systems, as defined in the Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
 - b. Approved Products / Manufacturers / Suppliers / 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 a convenience to Contractor as a listing of contact information only. It is not intended that all manufacturers in list may provide products where specific products and manufacturers are listed elsewhere in Section.
 - c. Acceptable Products / Manufacturers / Suppliers / Installers:
 - 1) Type One: Use specified products / manufacturers unless approval to use other products / manufacturers has been obtained from Architect by Addendum.
 - 2) Type Two: Use specified products / manufacturers unless approval to use other products and manufacturers has been obtained from Architect in writing before installing or applying unlisted or private-labeled products.
 - 3) Use 'Equal Product Approval Request Form' to request approval of equal products, manufacturers, or suppliers before bidding or before installation, as noted in individual Sections.

- d. Quality / Performance Standard Products / Manufacturers:
 - 1) Class One: Use specified product / manufacturer or equal product from specified manufacturers only.
 - 2) Class Two: Use specified product / manufacturer or equal product from any manufacturer.
 - 3) Products / manufacturers used shall conform to Contract Document requirements.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

SECTION 01 6400
OWNER - FURNISHED PRODUCTS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Administrative and procedural requirements for Owner-Furnished Products. Install items furnished by Owner or receive and store in safe condition items purchased directly by Owner according to requirements of Contract Documents:
 - 1. Fixed Tackboards. See Section 10 1123.
 - 2. Interior Signage. See Section 10 1495.
 - 3. Projection Screens. See Section 11 5213.
 - 4. Selected Toilet Accessories. See Section 10 2813.
- B. Administrative and procedural requirements for Owner-Furnished Products. Install items furnished by Owner or receive, unload, store and protect in safe condition items purchased directly by Owner according to requirements of Contract Documents:
 - 1. Refer to Furnishings and Equipment Schedule on Drawings.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. General:
 - 1. Review 'Contractor Notice of Owner Furnished Materials' notice listing Owner-furnished products to be delivered for Project:
 - a. Review due (delivery) dates and vendor lead times for each item and coordinate with construction schedule. Immediately report recommended changes to Owner's Purchasing Coordinator listed in 'Contractor Notice of Owner Furnished Materials'. Contact vendors directly if changes to delivery dates become necessary during construction.
 - b. Report problems in coordinating due (delivery) dates with construction schedule to Architect and Owner's Purchasing Coordinator.
 - 2. Receive unload, store and protect Owner-furnished materials and products.
 - a. Provide labor and equipment necessary to receive, unload, and store materials and products.
 - b. Count number of pieces received and note any discrepancies on Delivery Receipt before driver leaves:
 - 1) Compare 'Contractor Notice of Owner Furnished Materials' notice' with packing slips.
 - 2) Note discrepancies in number, size, color, model numbers, etc. on Delivery Receipt.
 - c. Include Project Name and Project Number on Delivery Receipt.
 - d. Check for visible evidence of damage such as holes, tears, or crushed portions of cartons and note on Delivery Receipt before driver leaves:
 - 1) Include Project Name and Project Number on Delivery Receipt.
 - 2) If you are unsure if carton is damaged, take photo of cartons and share it with Owner's Purchasing Coordinator.
 - e. Properly store and protect all deliveries of Owner Furnished materials and Products.
 - 3. Within forty-eight (48) hours of delivery:
 - a. Open and inspect each piece of freight delivered. Take picture of any concealed damage not reported at time of delivery and report it to Owner's Purchasing Coordinator.
 - b. Compare 'Contractor Notice of Owner Furnished Materials' with packing slips. Note discrepancies in number, size, color, model numbers, etc.
 - c. Deliver copy of Delivery Receipt (bill of lading) on which you have noted any loss or damage to Owner's Purchasing Coordinator. Include in your submission any report of concealed damage, discrepancies or photos.
 - 4. Failure to strictly follow above procedures will result in your assumption of all financial responsibility for this shipment. All replacement and reorders must be made through Owner's Purchasing Coordinator and must allow Owner's vendor sufficient lead time to produce and ship new product.
 - 5. When above procedures are strictly followed, shortages and damaged items will be replaced by Owner at Owner's cost.

PART 2 - PRODUCTS Not Used**PART 3 - EXECUTION Not Used**

END OF SECTION

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

A. Section Includes But is Not Limited To:

1. Administrative and procedural requirements for Product Delivery, Storage, and Handling Requirements.

1.2 ADMINISTRATIVE REQUIREMENTS

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

1.3 DELIVERY AND ACCEPTANCE REQUIREMENTS

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

1.4 STORAGE AND HANDLING REQUIREMENTS

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

PART 2 - PRODUCTS Not Used**PART 3 - EXECUTION Not Used**

END OF SECTION

**SECTION 01 7100
EXAMINATION AND PREPARATION**

PART 1 - GENERAL**1.1 SUMMARY**

A. Section Includes But is Not Limited To:

1. Administrative and procedural for Examination And Preparation of the Work.

PART 2 - PRODUCTS: Not Used**PART 3 - EXECUTION****3.1 FIELD ENGINEERING**

A. Construction Layout:

1. Stake location and elevations of:

- a. Building slabs and utility / mechanical pads.
- b. Miscellaneous Cast-in-Place Concrete elements.

B. Construction Verification (During Construction):

1. Do not place construction materials before Architect's approval of survey of underlying substrate.
2. Survey elevations of rough grading:
 - a. Bottom of excavation at building pad.
3. Survey elevations of fill:
 - a. Building:
 - 1) Bottom of exterior footings.
 - 2) Top of engineered fill (bottom of aggregate base).

C. Construction Surveying:

1. Submit stamped and certified survey, performed by surveyor licensed by AHJ, showing compliance with Contract Documents for:
 - a. Building Entries.
 - b. Building locations and elevations of footings, building slabs, and utility / mechanical pads.
 - c. Locations and elevations of Miscellaneous Cast-in-Place Concrete elements.
 - d. Locations and elevations of catch basins, curb inlets, and other site drainage elements.
 - e. Elevations of rough grading.
2. Do not place construction materials before Architect's approval of survey.

3.2 PROTECTION OF ADJACENT CONSTRUCTION

A. Protect adjacent properties and constructions.

END OF SECTION

**SECTION 01 7300
EXECUTION****PART 1 - GENERAL****1.1 SUMMARY**

A. Section Includes But is Not Limited To:

1. Administrative and procedural requirements for governing Execution of the Work.

1.2 COMMON INSTALLATION PROVISIONS

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

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

SECTION 01 7400
CLEANING AND WASTE MANAGEMENT

1.1 SUMMARY

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

1.2 REFERENCES

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

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

- A. Comply with regulations of authorities having jurisdiction and safety standards for cleaning.
- B. Keep premises broom clean during progress of the Work.
- C. Keep site and adjoining streets reasonably clean. If necessary, sprinkle rubbish and debris with water to suppress dust.
- D. During handling and installation, protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from soiling, damage, or deterioration until Substantial Completion.
- E. Clean and maintain completed construction as frequently as necessary throughout construction period. Adjust and lubricate operable components to ensure ability to operate without damaging effects.
- F. Supervise construction activities to ensure that no part of construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.
- G. Before and during application of painting materials, clear area where such work is in progress of debris, rubbish, and building materials that may cause dust. Sweep floors and vacuum as required and take all possible steps to keep area dust free.
- H. Clean exposed surfaces and protect as necessary to avoid damage and deterioration.
- I. Place extra materials of value remaining after completion of associated work have become Owner's property as directed by Owner or Architect.
- J. Construction Waste Management And Disposal:
 - 1. Remove waste materials and rubbish caused by employees, Subcontractors, and contractors under separate contract with Owner and dispose of legally. Remove unsuitable or damaged materials and debris from building and from property.
 - a. Provide adequate waste receptacles and dispose of materials when full.
 - b. Properly store volatile waste and remove daily.
 - c. Do not deposit waste into storm drains, sanitary sewers, streams, or waterways. Do not discharge volatile, harmful, or dangerous materials into drainage systems.

2. Do not burn waste materials or build fires on site. Do not bury debris or excess materials on Owner's property.

3.2 FINAL CLEANING

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

END OF SECTION

**SECTION 01 7700
CLOSEOUT PROCEDURES**

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 GENERAL

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

1.3 PRELIMINARY CLOSEOUT REVIEW

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

1.4 SUBSTANTIAL COMPLETION INSPECTION

- A. When Architect, Owner and Contractor agree that project is ready for Substantial Completion, an inspection is held. Punch list created at Pre-Substantial Inspection is to be substantially complete.
- B. Prior to this inspection, Contractor shall discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups and similar elements.
- C. Architect, Owner and Contractor review completion of punch list items. When Owner and Architect confirm that Contractor has achieved Substantial Completion of The Work, Owner, Architect and Contractor will execute Certificate of Substantial Completion that contains:
 - 1. Date of Substantial Completion.
 - 2. Punch List Work not yet completed, including seasonal and long lead items.
 - 3. Amount to be withheld for completion of Punch List Work.
 - 4. Time period for completion of Punch List Work.
 - 5. Amount of liquidated damages set forth in Supplementary Conditions to be assessed if Contractor fails to complete Punch List Work within time set forth in Certificate.
- D. Contractor shall present Closeout Submittals to Architect and place tools, spare parts, extra stock, and similar items required by Contract Documents in locations as directed by Facilities Manager.

1.5 FINAL ACCEPTANCE MEETING

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

END OF SECTION

**SECTION 01 7800
CLOSEOUT SUBMITTALS**

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 ADMINISTRATIVE REQUIREMENTS

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

1.3 CLOSEOUT SUBMITTALS

- A. Operations And Maintenance Manual:
 - 1. General:
 - a. Include closeout submittal documentation as required by Contract Documentation.
 - b. Include workmanship bonds, final certifications, equipment check-out sheets, and similar documents.
 - c. Releases enabling Owner unrestricted use of The Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - d. Include Project photographs, damage or settlement survey, and similar record information required by Contract Documents.
 - e. Submittal Format:
 - 1) Digital copies unless otherwise noted, required for each individual specification section that include 'Closeout Submittals'.
 - 2) Include only closeout submittals as defined in individual specification section as required in Contract Documents.
 - 2. Project Manual:
 - a. Copy of complete Project Manual including Addenda, Modifications as defined in General Conditions, and other interpretations issued during construction:
 - 1) Mark these documents to show variations in actual Work performed in comparison with text of specifications and Modifications.
 - 2) Show substitutions, selection of options, and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.
 - 3. Maintenance Contracts:
 - a. Digital format only.

4. Operations and Maintenance Data:
 - a. Digital format only:
 - 1) Cleaning instructions.
 - 2) Maintenance instructions.
 - 3) Operations instructions.
 - 4) Equipment list.
 - 5) Parts list.
5. Warranty Documentation:
 - a. Digital format of final, executed warranties.
6. Record Documentation:
 - a. Digital format only.
 - 1) Certifications.
 - 2) Color and pattern selections.
 - 3) Design Data.
 - 4) Geotechnical Evaluation Reports (soils reports).
 - 5) Manufacture Reports.
 - 6) Manufacturer's literature or cut sheets.
 - 7) Shop Drawings.
 - 8) Source Quality Control.
 - 9) Special Procedures.
 - 10) Testing and Inspection Agency Reports.
 - 11) Testing and Inspection Reports.
7. Software:
 - a. Audio and Video System software, programming and set-files.

1.4 MAINTENANCE MATERIAL SUBMITTALS

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

1.5 WARRANTIES

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

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

DIVISION 03: CONCRETE

03 1000 CONCRETE FORMING AND ACCESSORIES

- 03 1113 STRUCTURAL CAST-IN-PLACE CONCRETE FORMING
- 03 1511 CONCRETE ANCHORS

03 2000 CONCRETE REINFORCING

- 03 2100 REINFORCEMENT BARS

03 3000 CAST-IN-PLACE CONCRETE

- 03 3111 CAST-IN-PLACE STRUCTURAL CONCRETE
- 03 3517 CONCRETE SEALER-FINISHING
- 03 3923 MEMBRANE CONCRETE CURING

03 6000 GROUTING

- 03 6213 NON-METALLIC NON-SHRINK GROUT

END OF TABLE OF CONTENTS

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SECTION 03 1113
STRUCTURAL CAST-IN-PLACE CONCRETE FORMING

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Design, construction, and safety of formwork.
 - 2. Furnish and install required formwork ready for placing of concrete.
 - 3. Strip and dispose of formwork.
- B. Related Requirements:
 - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
 - a. Tolerances for placing structural concrete.
 - b. Pre-installation conference held jointly with other concrete related sections.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in pre-installation conference as specified in Section 03 3111.
 - 2. In addition to agenda items specified in Section 01 3100 and 31 3111, review following:
 - a. 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 requirements and frequency of testing and inspections.
- B. Scheduling:
 - 1. Notify Testing Agency and Architect as directed in Section 03 3111.

1.3 SUBMITTALS

- A. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Printed application instructions for form release agents.

PART 2 - PRODUCTS**2.1 COMPONENTS**

- A. Forms: Wood, metal, or plastic as arranged by Contractor:
 - 1. Forming material shall be compatible with specified form release agents and with finish requirements for concrete to be left exposed or to receive a smooth rubbed finish.

2.2 ACCESSORIES

- A. Form Release Agents:
 - 1. Unexposed Surfaces Only: Contractor's option.
- B. Expansion Joint Filler Material:
 - 1. Design Criteria:
 - a. Resilient, flexible, non-extruding, expansion-contraction joint filler, with strippable vinyl top.
 - b. Meet requirements of ASTM D1751 and AASHTO M 213.
 - c. Resilience:
 - 1) When compressed to half of original thickness, recover to minimum of seventy (70) percent of original thickness.
 - d. Thickness: 1/2 inch.
 - 2. Strippable Top:
 - a. Type Two Acceptable Products:
 - 1) Snap-Cap Joint Cap by W.R. Meadows, Hampshire, IL www.wrmeadows.com
 - 2) Equal as approved by Architect before installation. See Section 01 6200.
 - 3. Expansion Filler Material:
 - a. Type Two Acceptable Products:
 - 1) Fiber Expansion Joint by W R Meadows, Hampshire, IL www.wrmeadows.com.
 - 2) Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Forms:
 - 1. Assemble forms so forms are sufficiently tight to prevent leakage.
 - 2. Properly brace and tie forms.
 - 3. Make proper form adjustments before, during, and after concreting.
 - 4. Use new forms, or used forms that have been cleaned of loose concrete and other debris from previous concreting and repaired to proper condition. Use APA Plyform B-B Class I, or APA HDO Plyform B-B Class I, on exposed to view concrete that do not receive a smooth rubbed finish.

- B. Accessories:
 - 1. General:
 - a. Provide for installation of inserts, templates, fastening devices, sleeves, and other accessories to be set in concrete before placing.
 - b. Position anchor bolts for hold-down anchors and columns and securely tie in place before placing concrete.
 - 2. Form Release / Finish Agents:
 - a. Film thickness shall be no thicker than as recommended by Manufacturer.
 - b. Allow no release / finish agent on reinforcing steel or footings.
 - 3. Expansion Joints:
 - a. Install at joints between floor slab and foundation wall where shown on Drawings.
- C. Form Removal (Slab on Grade):
 - 1. Removal of forms can usually be accomplished in twelve (12) to twenty-four (24) hours.
 - 2. If temperature is below 50 deg F or if concrete (stairs, beams, etc) depends on forms for structural support, leave forms intact for sufficient period for concrete to reach adequate strength.
 - 3. For exposed to view surfaces that receive a smooth rubbed finish, remove forms while concrete is still "green".
 - 4. Metal bars or prys should not be used. Use wood wedges, tapping gradually when necessary.

3.2 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
 - 1. Concrete Formwork:
 - a. Inspections are not required and will be performed at discretion of Architect.

END OF SECTION

**SECTION 03 1511
CONCRETE ANCHORS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Cast-in place and post-installed concrete anchors including:
 - a. Adhesive anchors for concrete.
 - b. Deformed bar anchors for concrete.
 - c. Expansion anchors for concrete.
 - d. Headed concrete anchor studs for concrete.
 - e. J-bolts and headed cast-in-place bolts.
 - f. Screw anchors for concrete.
 - g. Concrete anchors and inserts not specified elsewhere.
 - 2. Installer responsible when inspection results of concrete anchors require corrective actions.
- B. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
 - 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 3. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation and inspection of cast-in-place anchors.
 - 4. Section 06 1100: 'Wood Framing' for installation of drilled in anchors.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling:
 - 1. Inspection shall be performed according IBC requirements.
 - 2. Notify Testing Agency and Architect one week before installing anchors so inspection may be scheduled.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's product literature for each item.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Adhesive Anchors:
 - 1) Installer to provide current ACI/CRSI certification to Architect prior to installation of anchors.
 - 2. Test And Evaluation Reports:
 - a. Provide ESR for products used indicating conformance with current applicable ESR Acceptance Criteria.
 - 3. Manufacturer's Instructions:
 - a. Manufacturer's published installation recommendations for each item.
 - 4. Qualification Statements:
 - a. All concrete anchors except Adhesive Anchors:
 - 1) Installer to provide record of installer installation training showing dates and those trained for all installed products when required when by Architect.
- C. 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 inspection reports of all inspected anchors.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer:
 - a. Having sufficient capacity to produce and deliver required materials without causing delay in work.
 - 2. Installer:
 - a. Acceptable to Manufacturer, experienced in performing work of this section and has specialized in installation of work similar to that required for this project.

- b. Adhesive Anchors:
 - 1) Adhesive Anchors installed in horizontal to vertical overhead orientation to support sustained tension loads shall be installed by Certified Adhesive Anchor Installer (AAI) as certified through ACI/CRSI:
 - a) Refer to most current version of ACI 318 for certification requirements.
 - b) Proof of current certification shall be submitted to the Architect for approval prior to commencement of installation.
 - c. All other Concrete Anchors:
 - 1) Arrange for manufacturer's field representative to provide installation training for all products to be used, prior to commencement of work:
 - a) Provide installation training when required by Architect.
- B. Field Inspection:
- 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - 2. Owner will provide Inspection for post-installed concrete anchors:
 - a. Owner will employ testing agency to perform inspection for post-installed concrete anchors 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'.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
 - 1. Store materials protected from exposure to harmful weather conditions and as directed by Manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete Anchors:
 - 1. General:
 - a. Use hot-dipped galvanized or stainless steel with matching nuts and washers in exterior and moist interior applications unless indicated otherwise on Contract Drawings.
 - b. Install hot-dipped or stainless steel anchor bolts to attach wood sill plates to foundation with 1/4 inch by 3 inch x 3 inch minimum adjustable plate washers and standard cut washers between wood sill plates and nuts.
 - c. Nut: Conform to requirements of ASTM A563, Grade A, Hex.
 - d. Conform to requirements of ASTM F3125/F3125 for chemical, physical and mechanical requirements for quenched and tempered bolts manufactured from steel and alloy steel.
 - 2. Threaded rod for adhesive anchors and cast-in anchors:
 - a. Conform to requirements of ASTM A307, Grade A or ASTM F1554 Grade 36 unless indicated otherwise on Contract Drawings.
 - 3. Cast-In-Place Anchor Bolts:
 - a. J-Bolts:
 - 1) Non-headed type threaded 2 inches minimum conforming to requirements of ASTM F1554, Grade A.
 - 2) Anchor hook to project 2 inches minimum including bolt diameter.
 - b. Headed Bolts:
 - 1) Headed type threaded 2 inches minimum conforming to requirements of ASTM F1554, Grade A.
 - 4. Headed Concrete Anchor Studs:
 - a. Composed of low carbon steel meeting requirements of ASTM A108.
 - b. Tensile Strength: 61,000 psi minimum.
 - c. Yield Strength: 49,000 psi minimum.
 - 5. Deformed Bar Anchors:
 - a. Manufactured in accordance with requirements of ASTM A1064/A1064M.
 - b. Tensile Strength: 80,000 psi minimum.
 - c. Yield Strength: 70,000 psi minimum.

6. Reinforcing Bars:
 - a. Composed of deformed carbon steel meeting requirements of ASTM A615/A615M, Grade 60.
7. Adhesive Anchors:
 - a. Products shall have current ESR conforming to current ICC Acceptance Criteria AC308 for concrete.
 - b. Rod diameter and embedment length as indicated on Contract Drawings.
 - c. Type Two Acceptable Products:
 - 1) HIT-RE 500V3 with SafeSet Epoxy Adhesive by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
 - 2) Pure 110+ by Powers Fasteners Inc., Brewster NY www.powers.com.
 - 3) SET-XP Epoxy by Simpson Strong-Tie Co., Pleasanton, CA www.simpsonanchors.com.
 - 4) Equal as approved by Architect before installation. See Section 01 6200.
8. Expansion Anchors:
 - a. Products shall have current ESR conforming to current ICC Acceptance Criteria AC193 for concrete.
 - b. Type Two Acceptable Products:
 - 1) KWIK Bolt TZ Expansion Anchor by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
 - 2) Power-Stud +SD2 by Powers Fasteners Inc., Brewster NY www.powers.com.
 - 3) Strong-Bolt by Simpson Strong-Tie Co., Pleasanton, CA www.simpsonanchors.com.
 - 4) Equal as approved by Architect before installation. See Section 01 6200.
9. Screw Anchors:
 - a. Provide anchors with length identification markings conforming to ICC Acceptance Criteria AC 193 for concrete.
 - b. Type Two Acceptable Products:
 - 1) KWIK HUS-EZ by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
 - 2) Wedge-Bolt+ by Powers Fasteners Inc., Brewster NY www.powers.com.
 - 3) Titen HD by Simpson Strong Tie Co, Pleasanton, CA www.simpsonanchors.com.
 - 4) Equals as approved by Architect through shop drawing submittal before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
 1. Embedded Items:
 - a. Identify position of reinforcing steel and other embedded items before drilling holes for anchors:
 - 1) Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items.
 - 2) Take precautions as necessary to avoid damaging pre-stressing tendons, electrical and telecommunications conduit, and gas lines.
 - b. Notify Engineer if reinforcing steel or other embedded items are encountered during drilling.
 2. Base Material Strength:
 - a. Unless otherwise specified, do not drill holes in concrete until:
 - 1) Concrete has minimum age of 21 days at time of anchor installation.
 - 2) Concrete has achieved full design strength for load achievement.

3.2 PREPARATION

- A. Surface Preparation:
 1. Clean surfaces prior to installation.
 2. Prepare surface in accordance with Manufacturer's written recommendations.

3.3 INSTALLATION

- A. Post-Installed Anchors:
 1. General:
 - a. Drill holes with rotary impact hammer drills using carbide-tipped bits.
 - b. Unless otherwise shown on Drawings, drill holes perpendicular to concrete surface.
 - c. Perform anchor installation in accordance with Manufacturer's published instructions.
 2. Adhesive Anchors:

- a. Clean holes in accordance with Manufacturer's published instructions before installation of adhesive:
 - 1) Follow Manufacturer's recommendations to ensure proper mixing of adhesive components.
 - b. Adhesive:
 - 1) Inject adhesive into holes proceeding from bottom of hole and progressing toward surface so as to avoid introduction of air pockets into adhesive.
 - 2) Inject sufficient adhesive into hole to ensure that annular gap is filled to surface.
 - 3) Remove excess adhesive from surface and threads of anchor as necessary.
 - c. Shim anchors with suitable device to center anchor in hole. Do not disturb or load anchors before Manufacturer's specified cure time has elapsed.
 - d. Temperature:
 - 1) Observe Manufacturer's recommendations with respect to installation temperatures for adhesive anchors.
 - 2) Base material temperatures must be maintained above minimum temperatures allowed by Manufacturer for full required epoxy cure time.
3. Expansion Anchors:
 - a. Protect threads from damage during anchor installation and prior to use.
 - b. Set anchors to Manufacturer's recommended torque, using a torque wrench. Following attainment of ten (10) percent of specified torque, one hundred (100) percent of specified torque shall be reached within 7 or fewer complete turns of nut. If specified torque is not achieved within required number of turns, remove and replace anchor, unless otherwise directed by Architect.
 4. Screw Anchors:
 - a. Protect threads from damage during anchor installation and prior to use.
 - b. Set anchor flush, collared.
 - c. Do not exceed Manufacturer's maximum allowed torque when seating anchor.

3.4 FIELD QUALITY CONTROL

- A. Field And Inspections:
 1. Civil and structural field inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor.
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
 - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
 2. Expansion Anchors / Adhesive Anchors / Screw Anchors:
 - a. Certified Inspector from Testing Agency shall verify procedures used for installation of all concrete anchors and monitor their installation for compliance with Manufacturer's requirements.
 - b. Inspections:
 - 1) Inspections shall include required verification and inspection of anchors as referenced in IBC Table 1704.4 and in accordance with most current version of ACI 318 or ACI 318M and applicable ASTM material standards that:
 - a) The correct rod/anchor is used; size and type.
 - b) The correct hole size is used and prepared per Manufacturer's instructions.
 - c) That climactic conditions, and concrete temperature, allow for the anchors' installation and use.
 - d) Proper hole cleaning equipment, per Manufacturer's instructions, is used.
 - e) Torque applied to anchors does not exceed Manufacturer's allowable limits.
 - f) Torque applied to anchors is per Manufacturer's instructions.
- B. Non-Conforming Work:
 1. Contractor is to immediately notify Architect of incorrectly placed, misplaced or malfunctioning anchors and request instructions for corrective actions.

3.5 CLEANING

- A. Waste Management:
 1. Disposal of rubbish, debris, and packaging materials.

3.6 PROTECTION

A. General:

1. Protect installed products from damage during construction.

END OF SECTION

**SECTION 03 2100
REINFORCEMENT BARS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install concrete reinforcement bars as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
 - 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 3. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
 - 4. Section 03 2116: 'Epoxy-Coated Reinforcement Bars'.
 - 5. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
 - a. Reinforcement installed in concrete.
 - b. Pre-installation conference held jointly with other concrete related sections.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 03 3111.
 - 2. In addition to agenda items specified in Section 01 3100, and Section 03 3111, review following:
 - a. Installation scheduling and reinforcing placement.
 - b. 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 requirements and frequency of testing and inspections.
- B. Scheduling:
 - 1. Notify Testing Agency and Architect as directed in Section 03 3053 and Section 03 3111.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Reinforcing placement drawings.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Mill certificates for mill tests for reinforcing in accordance with ASTM A615/A615M.
- C. 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 Inspection Reports of reinforcement bars.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Comply with provisions of following codes and standards except where more stringent requirements are shown or specified:
 - a. American Concrete Institute:
 - 1) ACI 318, 'Building Code Requirements for Structural Concrete and Commentary'.
 - b. Concrete Reinforcing Steel Institute:
 - 1) CRSI, 'Manual of Standard Practice'.
- B. Qualifications:
 - 1. Throughout progress of the work of this section, provide at least one (1) person who shall be thoroughly familiar with Construction Documents and other applicable specified requirements, completely trained and experienced in necessary skills, and who shall be present at site and shall direct all work performed under this Section:
 - a. In actual installation of the work of this Section, use adequate numbers of skilled workmen to ensure installation in strict accordance with approved design.
 - b. In acceptance or rejection of work performed under this Section, no allowance will be made for lack of skill on part of workmen.
- C. Testing And Inspection:
 - 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.

2. Owner will provide Testing and Inspection for inspection of reinforcement bars:
 - a. Owner will employ testing agencies to perform testing and inspection for inspection of reinforcement bars 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'.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Deliver bars separated by size and tagged with manufacturer's heat or test identification number.
2. Reinforcement bars shall be free of heavy rust scales and flakes, or other coating at time of delivery and placing.

B. Storage And Handling Requirements:

1. Properly protect rebar on site after delivery.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Reinforcement Bars:

1. Bars shall have grade identification marks and conform to ASTM A615/A615M:
 - a. Grade 60 minimum, except dowels that are to be field bent, Grade 40 minimum.
2. Bars shall be deformed type.
3. Bars shall be free of heavy rust scales and flakes, or other bond-reducing coatings.

2.2 ACCESSORIES

A. Bar Supports:

1. Concrete masonry units or bricks are not acceptable.
2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).
3. Type Two Acceptable Products:
 - a. Concrete 'dobies' or blocks wired to reinforcing.
 - b. Manufactured chairs with 4 sq inch (25.8 sq cm) bearing surface on sub-grade, or other feature to prevent chair from being pushed into sub-grade or damaging vapor retarder under slabs on grade.
 - c. Equals as approved by Architect before installation. See Section 01 6200.

2.3 FABRICATION

- A. Fabricate reinforcement bars according to the Concrete Reinforcing Steel Institute (CRSI) 'Manual of Standard Practice' and details on Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Avoid cutting or puncturing vapor retarder during reinforcement placement and concrete operations.
2. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
3. Blowtorch shall not be used to facilitate field cutting or bending or any other reinforcing work.
4. Reinforcement shall not be bent after partially embedded in hardened concrete.

B. Placing Reinforcement:

1. Comply with Concrete Reinforcing Steel Institute CRSI 'Manual of Standard Practice' recommended practice for 'Placing Reinforcing Bars' for details and methods of reinforcement placement and supports. and as herein specified.
2. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations:
 - a. Locate and support reinforcing by chairs, runners, bolsters, bar supports, spacers, or hangers, as required as recommended by 'ACI Detailing Manual, except slab on grade work.
 - b. Support bars in slabs on grade and footings with specified bar supports around perimeter and at 4-1/2 feet on center each way maximum to maintain specified concrete cover.
 - c. Install bar supports at bar intersections.
3. Bend bars cold.
4. Dowel vertical reinforcement for formed concrete columns or walls out of footing or structure below with rebar of same size and spacing required above.

5. Securely anchor and tie reinforcement bars and dowels before placing concrete. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- C. Splices:
 1. Non-Concrete Structural System:
 - a. Avoid splices of reinforcement bars at points of maximum stress. Lap bars 60 bar diameters minimum unless dimensioned otherwise on Drawings. Run reinforcement bars continuous through cold joints.
 2. Concrete Structural System:
 - a. In beams, slabs, and walls, avoid splices of reinforcement bars at points of maximum stress.
 - b. Lap bars as follows:
 - 1) Compression Splices: 45 bar diameters minimum.
 - 2) Tension Splices: In accordance with ACI 318 Class B requirements.
 - 3) No splice shall be less than 20 inches (508 mm).
 - 4) For epoxy coated rebar, increase lap-splice lengths by 1.5 times those listed above.
 - c. In columns, splices in vertical bars are permitted only at floor levels or points of lateral support and shall consist of 45 bar diameter laps.
 - d. Run reinforcement bars continuous through cold joints.
- D. Tolerances:
 1. Provide following minimum concrete cover for reinforcement as per ACI 318 or ACI 318M. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations:
 - a. Concrete cast against and permanently exposed to earth:
 - 1) Interior Slabs on Grade: 1 inches (25 mm). clear from top of slab at 4 inches (100 mm) slabs, 2 inches (50 mm) clear at 6 inches (150 mm) slabs.
 - 2) Sections other than Slabs: 3 inches (75 mm).
 - b. Concrete Exposed to Earth or Weather:
 - 1) No. 6 and Larger Bars: 2 inches (50 mm).
 - 2) No. 5 and Smaller Bars, W31 and D31 Wire: 1-1/2 inches (38 mm).
 - c. Concrete not exposed to weather or in contact with ground:
 - 1) Slabs, walls, and joists:
 - a) No. 14 and No. 18 bars: 1-1/2 inches (38 mm).
 - b) No. 11 bars and smaller: 3/4 inches (19 mm).
 - 2) Beams and Columns:
 - a) Primary reinforcement, ties, stirrups and spirals: 1-1/2 inches (38 mm).
 - 3) Shells, folded plate members:
 - a) No. 6 bars and larger: 3/4 inch (19 mm).
 - b) No. 5 bar, W31 or D31 wire, and smaller: 1/2 inch (13 mm).

3.2 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
 1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor.
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
 - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
 2. Reinforcement Bars:
 - a. Testing Agency shall provide inspection for Reinforcement Bars. See Section 03 3111 for Testing and Inspection requirements.

END OF SECTION

SECTION 03 3111
CAST-IN-PLACE STRUCTURAL CONCRETE

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install concrete work as described in Contract Documents including:
 - a. Quality of concrete used on Project but furnished under other Sections.
 - b. Concrete mix information and use of admixtures.
 - c. Field Quality Control Testing and Inspection requirements for concrete.
 - d. Pre-installation conference held jointly with other concrete related sections.
 - e. Sealants and curing compounds used with concrete.
 - f. Compact aggregate base for miscellaneous cast-in-place concrete.
 - g. Miscellaneous cast-in-place concrete and equipment pads.
- B. Products Installed But Not Furnished Under This Section:
 - 1. Membrane Concrete Curing.
- C. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
 - 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 3. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
 - 4. Section 03 1511: 'Concrete Anchors and Inserts'.
 - 5. Section 03 2100: 'Reinforcement Bars'.
 - 6. Section 03 3517: 'Concrete Sealer Finishing' for application.
 - 7. Section 03 3923: 'Membrane Concrete Curing' for application.
 - 8. Section 07 9213: 'Elastomeric Joint Sealant' for quality of sealants.
 - 9. Section 31 0501: 'Common Earthwork Requirements' for:
 - a. General procedures and requirements for earthwork.
 - b. Pre-installation conference held jointly with other common earthwork related sections.
 - 10. Divisions 22, 23, And 26: Mechanical and electrical devices including boxes, conduits, pipes, hangers, inserts, and other work to be embedded in concrete work before placing.
 - 11. Furnishing of items to be embedded in concrete specified in Section involved.
 - 12. Owner will provide concrete leveling compounds and patching compounds required for carpet installation.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in MANDATORY 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 2100: 'Reinforcement Bars'.
 - c. Section 26 0526: 'Grounding And Bonding For Electrical Systems'.
 - 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. Set up concrete placement pour card system and verify that all relevant trades have signed off prior to concrete placement.
 - b. Obtaining trade sign-offs on each pour card will be responsibility of General Contactor's foreman or whoever is in charge of ordering concrete.
 - c. Pour cards will be turned in to Quality Assurance representative after the work has been completed so that they can be reviewed and filed.
 - d. Review installation scheduling, coordination, placement of building concrete, and placement of items installed in and under concrete.
 - e. Review installation scheduling, coordination and placement of site concrete and of items installed in concrete.
 - f. Review 'Verification of Conditions' requirements.
 - g. Review requirements for preparation of subgrade and aggregate base requirements.
 - h. Review formwork requirements.
 - i. Review approved mix design requirements, mix designs and use of admixtures.
 - j. Review reinforcing bar submittals.

- k. Review installation schedule and placement of reinforcing bars.
- l. Review placement, finishing, and curing of concrete, including cold and hot weather requirements.
- m. Review joint plan for control and expansion joints, fillers for sidewalks, curbs, and gutters.
- n. Review smooth rubbed concrete finish procedures and requirements (applied immediately after removing concrete formwork while concrete is 'green').
- o. Review concrete slab tolerances and corrective measures if tolerances not met.
- p. Review safety issues.
- q. 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 requirements and frequency of testing and inspections.

B. Scheduling:

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

1.3 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.
- 2. 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. Manufacturer's Instructions:
 - a. Provide Manufacturer's installation for following:
 - 1) Floor and slab treatments.
- 4. Source Quality Control Submittals:
 - a. Concrete mix design: Submit mix designs to meet following requirements:
 - 1) Mix Type A:
 - a) General purpose concrete type mix used for footings and for exterior concrete (excluding concrete paving) where not subject to freeze/thaw cycles and deicing or where higher strength is needed due to soil conditions.
 - b) 3000 psi minimum at twenty-eight (28) days.
 - c) Water / Cementitious Material: 0.45 to 0.50 by weight.
 - 2) Mix Type B:
 - a) Unexposed interior concrete slabs on grade.
 - b) 3500 psi minimum at twenty-eight (28) days.
 - c) Water / Cementitious Material: 0.45 maximum by weight.
 - 3) Mix Type C:
 - a) Exposed interior concrete slabs on grade and exposed interior concrete slabs on grade that receive polished floor finishing system or where control joints are spaced far apart or are not used.
 - b) 3500 psi minimum at twenty-eight (28) days.
 - c) Water / Cementitious Material: 0.45 maximum by weight.
 - d) Drying shrinkage of concrete mix is to be limited to 0.032 percent at twenty-eight (28) days when tested per ASTM C157. Use 1 gal of shrinkage reducing admixture per 1 cu yd of concrete.
 - 4) Mix Type D:
 - a) For exterior concrete paving, curbs, gutters, and waterways not exposed to freeze/thaw cycles and deicing salts.
 - b) 4000 psi minimum at twenty-eight (28) days.
 - c) Water / Cementitious Material: 0.45 maximum by weight.
 - d) For concrete paving, use mix design based upon use of 1-1/2 inches coarse aggregate (about 15 percent).
 - 5) Mix Type E:
 - a) Exterior concrete exposed to freeze/thaw cycles and deicing salts or where soils are 'corrosive'.
 - b) 4500 psi minimum at twenty-eight (28) days.
 - c) Water / Cementitious Material: 0.40 maximum by weight.
 - d) Use twenty-five (25) percent Class F fly ash as part of cementitious material.
 - e) For concrete paving, use mix design based upon use of 1-1/2 inches coarse aggregate (about 15 percent).
 - 6) Air Entrainment: Six (6) percent, plus or minus 1-1/2 percent for exterior concrete and foundation walls exposed to freeze/thaw cycles.
 - 7) 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.
 - b. Slump:
 - 1) 4 inch slump maximum before addition of high range water reducer.
 - 2) 8 inch slump maximum with use of high range water reducer.
 - c. Admixtures:
 - 1) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use. Do not use any admixture without Architect's written approval.
 - 2) Fly ash: Amount of specified Class F (or Class C where Class F is not available) fly ash not to exceed twenty-five (25) percent of weight of cementations materials may used.
 - 3) Chemical: Specified accelerator or retarder may be used if necessary to meet environmental conditions.
 - 4) Chemical: Special additives to promote rapid drying concrete may be used in interior concrete slabs on grade if necessary to meet construction schedules.
- 5. Manufacturer's Reports:
 - a. Provide Manufacturer's performance and testing data for following:
 - 1) Each admixture used.

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.

1.4 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 Tech and Concrete Laboratory Testing Tech - Grade I. Testing Agency laboratory supervisor shall be ACI-certified Concrete Laboratory Testing Technician - Grade II.
- B. Testing And Inspection:
 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 2. 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'.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 1. Expansion Joint 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 Joint 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. Aridus Admixture by US Concrete, Euless, TX www.us-concrete.com/aridus/.
 - b. BASF (Construction Chemicals Division), Cleveland, OH www.master-builders-solutions.basf.us/en-us.

- c. Bonsal American, Charlotte, NC www.bonsal.com.
 - d. Concure Systems Admixture by Concure Systems, Phoenix, AZ www.ConcureSystems.com.
 - e. Dayton Superior Specialty Chemicals, Kansas City, KS www.daytonsuperiorchemical.com.
 - f. Euclid Chemical Company, Cleveland, OH www.euclidchemical.com.
 - g. Fritz-Pak Concrete Admixtures, Dallas, TX www.fritzpak.com.
 - h. GCP Applied Technologies, Cambridge, MA www.gcpat.com/construction/en-us.
 - i. L & M Construction Chemicals, Omaha, NE www.lmcc.com.
 - j. Larsen Weldcrete by Larsen Products Corp, Rockville, MD www.larsenproducts.com.
 - k. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com and Sika Canada, Pointe Claire, QC www.sika.ca.
 - l. Unitex, Kansas City, MO www.unitex-chemicals.com.
 - m. U S Mix Products Co, Denver, CO www.usspec.com.
 - n. W R Meadows, Hampshire, IL 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: 70 percent minimum of 28 day strengths.
 - 2) At 28 days: 100 percent minimum of 28 day strengths.
- C. Materials:
- 1. Hydraulic Cement: Meet requirements of ASTM C150/C150M, Type **<Insert Type>**.
 - a. Meet requirements of ASTM C595/C595M, Type **<Insert Type>**.
 - b. Meet requirements of ASTM C1157/C1157M, Type **<Insert Type>**.
 - 2. 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.
 - c. Fine:
 - 1) Meet requirements of ASTM C33/C33M.
 - 2) Aggregate shall be uniformly graded by weight.
 - 3. Water: Clear, apparently clean, and potable.
 - 4. Admixtures And Miscellaneous:
 - a. Fly Ash:
 - 1) 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.
 - 3) Water Reducing Admixture:
 - a) Meet requirements of ASTM C494/C494M, Type A and containing not more than 0.05 percent chloride ions.

- 4) Water Reducing, Retarding Admixture:
 - a) Meet requirements of ASTM C494/C494M, Type D and contain not more than 0.05 percent chloride ions.
- 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.
- 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.
- 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.
- 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.
- 9) Shrinkage Reducing Admixture (SRA):
 - a) Liquid admixture specifically designed to reduce drying shrinkage and potential for cracking.
- 10) Rapid Drying Admixture in Interior Concrete Slabs on Grade:
 - a) Admixture specifically designed to promote rapid drying of concrete.

2.2 ACCESSORIES

- A. Formwork, Bonding Agents, and Expansion Joint Filler:
 1. Meet requirements specified in Section 03 1113.

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. 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.

3. 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.
 - 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 minimum at time of concrete placement.
 - 3) Thaw sub-grade 6 inches deep minimum before beginning concrete placement. If necessary, re-compact thawed material.
 - 4) Use no frozen materials or materials containing ice.
 - 5) See ACI 306.1 'Standard Specification for Cold Weather Concreting' for additional requirements.
4. Hot Weather Concreting Procedures:
 - a. General:
 - 1) Maximum concrete temperature allowed is 90 deg F in hot weather.
 - 2) Cool aggregate and subgrades by sprinkling.
 - 3) Avoid cement over 140 deg F.
 - 4) Use cold mixing water or ice.
 - 5) Use fog spray or evaporation retardant to lessen rapid evaporation from concrete surface.
 - 6) See ACI 305.1 'Specification for Hot Weather Concreting' for additional requirements.
- B. Surface Preparation:
 1. Earthwork Preparation:
 - a. Prepare subgrade and aggregate base as specified in Division 31.
 2. Inserts, bolts, boxes, templates, pipes, conduits, and other accessories required by Divisions 22, 23, and 26 shall be installed and inspected before placing concrete.
 3. 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:

3.3 INSTALLATION

- A. Placing Concrete:
 1. 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. Compact concrete in forms by vibrating and other means where required.
 - 1) Thoroughly consolidate concrete around reinforcing bars
 - 2) Use and type of vibrators shall conform to ACI 309.
 - f. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree into landscaped areas.
 - 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.
 - k. Dusting with cement not permitted.
 2. Footings:
 - a. Level top of finish footing and leave rough.
 - b. Where joints are required, bulkhead, key horizontally, and dowel with two No. 5 reinforcing bars, 48 inches long.
 3. Foundation Walls: Leave steel projecting where required for floor tie.
 4. Interior Slabs:
 - a. For continuous placing and where shown on Drawings, saw cut one inch deep control joints before shrinkage occurs (2 inches at 6 inch slabs) Do not install control joints where Drawings indicate they are not to be installed.
 5. Miscellaneous Concrete Elements:
 - a. Mow Strips and Aprons:
 - 1) Aggregate base not necessary under mow strips and aprons.

- 2) Tool aprons adjacent to building with 1/2" radius and caulk with sealant.
- b. Sidewalks, Exterior Stairs, And Landings:
 - 1) Slope with cross slope of 1/8 to 1/4 inch per ft (one to two percent) in direction of intended drainage.
 - 2) Slope away from building 1/8 to 1/4 inch per ft (one to two percent) minimum.
 - 3) 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.
6. Joints:
 - a. Control Joints (Contraction Joints):
 - 1) Form control joints with early-entry, dry-cut saws as soon as final trowel operations are complete and joints can be cut without raveling.
 - 2) Depth of control joints shall be approximately one quarter of concrete slab thickness, but not less than one inch.
 - 3) Control joints to be hand tooled in sidewalks, curbs and gutters, mow strips, and aprons.
 - 4) Table One:

Concrete Control Joint On-Center Spacing (+/-)		
Sidewalks	5 feet	
Curbs and Gutters	10 feet	
 - b. Expansion Joints:
 - 1) Install so top of expansion joint material is 1/4 inch below finished surface of concrete.
 - 2) No expansion joint required between curbs and sidewalks parallel to curb.
 - 3) 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).
 - 4) Provide expansion joints between sidewalks that are parallel, and adjacent, to storage building or main building.
 - 5) 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.
 - 6) Table Two:

Concrete Expansion Joint (Isolation) On-Center Spacing (+/-)		
Sidewalks, Curbs and Gutters	40 feet	
 - 7) Seal all expansion joints as specified in Section 07 9213 for following areas:
7. 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.
8. 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. Finishing:
 1. Interior Concrete Flatwork:
 - a. Screed Concrete.
 - b. Float Finish:
 - 1) Float as soon after screeding as possible.
 - 2) Consolidate surface with power-driven floats with exception of areas inaccessible to power-driven floats, which may be hand-floated.
 - 3) Re-straighten, cutting down high spots and filling low spots.
 - 4) Repeat float passes and re-straightening until surface has uniform, smooth, granular texture.
 - c. Rough:
 - 1) Top of building slab to receive setting bed for ceramic or paver tile.

- d. Trowel Finish:
 - 1) Steel trowel slab after concrete has set enough to avoid bringing water and fines to surface.
 - 2) Perform troweling with power-driven trowels with exception of areas inaccessible to power-driven trowels, which may be hand-troweled.
 - 3) Continue troweling passes and re-straightening with 10 foot highway straightedge until surface is free of trowel marks and uniform in texture and appearance.
 - 4) Apply burnished, burned-out trowel finish.
 - 2. Exterior Concrete Flatwork:
 - a. Curb, Gutter, Sidewalks, Mow Strips, Flat Drainage Structures, Stairs, And Miscellaneous:
 - 1) After completion of final floating, performed immediately after screeding and 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.
 - b) Provide rough hair finish where grades exceed 6 percent 1-1/4 inch.
 - 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 radius, including edges formed by expansion joints.
 - g) Remove edger marks.
 - 3. Vertical Surfaces:
 - a. Exposed Foundations, etc:
 - 1) Finish provided by form release / finish agent specified in 03 1113.
 - 2) Repair of Unacceptable Concrete.
 - a) Immediately after removing forms, remove joints, marks, bellies, projections, loose materials, and cut back metal ties from surfaces to be exposed.
 - b) Hand rub while concrete is still green to provide hand-rubbed finish.
- C. Curing:
- 1. Membrane Concrete Curing:
 - a. As specified in Section 09 3923 'Membrane Concrete Curing'.
 - b. Follow Manufacturer's written instructions for preparation, application rates, placement, and cleanup:
 - 1) Apply as soon as troweling on interior concrete is complete.
 - 2) Apply as soon as brooming or finishing of exterior concrete is complete.
 - 3) Spraying application is required.
 - 4) Do not dilute or thin product.
 - 5) Do not apply when temperature of concrete is less than 40 deg F.
 - 6) Apply uniformly without puddles or ponding.
 - 7) Do not apply before bleed water has dissipated.
 - 8) Do not apply over standing water.
- D. Exterior Concrete Sealer:
- 1. Exterior Concrete Sealer:
 - a. Exterior concrete placed after about September 1 and located in areas of freeze/thaw cycles and deicing salts are to be sealed per Section 03 3517 'Exterior Concrete Sealer'.
 - b. Apply product as specified in Section 03 3517.
- E. Joint Filling:
- 1. Retail, Process, and Yard Sales area concrete slab:
 - a. Do not fill contraction joints with semi-rigid joint filler for two months minimum and after construction traffic has permanently ceased.

- b. Remove dirt, debris, saw cuttings and other deleterious materials from joints. Prepare joints as required by Joint Manufacturer leaving contact faces of joints clean and dry.
 - c. Overfill joints and grind or razor off excess to leave filler flush with concrete.
- F. Tolerances:

1. General:

- a. Tolerances shall conform to requirements of ACI 117 or CSA A23.1/A23.2, except where specified differently:
 - 1) 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.
- b. Maximum Variation Tolerances:

1) Table Three:

Thickness, standard	plus 3/8 inch, minus 1/4 inch
Thickness, footings	minus 0 inch
Plan, 0 - 20 feet	1/2 inch
Plan, 40 feet or greater	3/4 inch
Plan, footings	plus 1/2 inch
Eccentricity, footings	2 inch maximum standard, 1/2 inch at masonry
Openings, size	minus 1/4 inch, plus One inch
Openings, location	plus / minus 1/2 inch at cen- ter
Plumb	1/2 inch maximum

2. Local Flatness / Levelness of Interior Slabs:

a. Carpet and Tile Areas:

- 1) Specified Overall Value of F_{F25} / F_{L20} and Minimum Local Value of F_{F15} / F_{L13} when tested in accordance with ASTM E1155.
- 2) Specified Overall Value of F_{F30} / F_{L20} and Minimum Local Value of F_{F18} / F_{L13} when tested in accordance with ASTM E1155 in ceramic, resilient or vinyl tiled areas.
- 3) Used on building slabs to be covered by carpet and tile as shown on Contract Drawings. Verify and coordinate with Finish Schedule.
- 4) Remedy For Out-of-Tolerance Building Slabs:
 - a) Sections of building slabs which do not meet specified tolerances but are within ten (10) percent of specified tolerances, may be corrected by grinding or filling, at Owner's option.
 - b) Remove and replace sections of slabs measuring outside specified correctable tolerances.
 - c) Carpet areas: If floor leveling compounds or concrete patching compounds are required to bring floor into specified tolerances, they will be provided by Owner in conjunction with carpet installation and back-charged to Contractor.

3. Local Flatness / Levelness of Exterior Slabs:

- a. Specified Overall Value of F_{L35} and Minimum Local Value of F_{L20} when tested in accordance with ASTM E1155.

3.4 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

- 1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor:
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
 - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
- 2. Reinforcement Bars and Bolts:
 - a. Testing Agency shall provide inspections will include following:
 - 1) Bolts:
 - a) Inspection of bolts to be installed in concrete prior to and during placement of concrete.
 - b) Periodic inspection of anchors installed in hardened concrete.

- 2) Reinforcement Bars:
 - a) Periodic inspection of reinforcement bars and placement prior to concrete placement to verify grade, size, cover, spacing, and position of reinforcing.
 - b) Inspect that all reinforcement bars are be positively identified as to heat number and mill analysis.
 - c) Confirm surface of reinforcing bars is free of form release oil or other deleterious substances.
3. Concrete:
 - a. Testing Agency shall provide testing and inspection for concrete as per ASTM C1077.
 - b. Testing and inspections, if performed, will include following:
 - 1) Periodic inspection verifying use of required design mix.
 - 2) Inspection of reinforcing bars and anchor bolts before placement of concrete for proper installation.
 - 3) Inspection at time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine temperature of concrete.
 - 4) Inspection of concrete placement for proper application techniques.
 - a) Steel tools are not to be used on exterior concrete.
 - 5) Periodic inspection for maintenance of specified curing temperature and techniques:
 - a) Steel tools are not to be used on exterior concrete. Bull floating and finish floating is to be performed with magnesium or wood floats.
 - 6) 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.
 - 7) Periodic inspection of concrete finishing operations for proper finishing techniques.
 - 8) Periodic inspection for placement of specified curing compounds.
 - c. 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.
 - 2) Concrete floor flatness and floor levelness of interior slabs as per ASTM E1155.
 - 3) Concrete moisture and alkalinity testing. See Section 09 0503 Flooring Substrate Preparation.
 - d. 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.
 - e. Compressive Strength Tests: ASTM C39/C39M:
 - 1) Obtain one (1) composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd, but less than 50 cu. yd plus one (1) set for each additional 50 cu. yd or fraction thereof.
 - 2) 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.
 - 3) 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.
 - 4) 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.

- f. Samples:
 - 1) Fresh Concrete: ASTM C172/C172M except modified for slump to comply with ASTM C94/C94M.
 - a) Slump: ASTM C143/C43M, 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.
 - 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.
- 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.

3.5 CLEANING

- A. General:
 - 1. Curing:
 - a. Clean tools, equipment as directed by Manufacturer's instructions.

3.6 PROTECTION

- A. Concrete:
 - 1. Protect concrete that has not received its initial set from precipitation to avoid excess water in mix and unsatisfactory surface finish.
 - 2. 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.
 - 3. Protect interior concrete floors from stains, paint, mortar and other construction activities.
- B. Curing:
 - 1. Restrict foot or vehicle traffic as curing membrane dries as recommended by Manufacturer.

END OF SECTION

**SECTION 03 3517
CONCRETE SEALER FINISHING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install Concrete Sealer on concrete surfaces as described in Contract Documents including:
 - a. Concrete sealers are used on existing or new exterior concrete surfaces exposed to freeze/thaw cycles and deicing salts or where exterior concrete is placed after about September 1st or as otherwise desired by Project Manager or Facilities Manager.
 - 1) Concrete sealer on exterior concrete is not needed or used in areas not exposed to freeze/thaw cycles and deicing salts.
- B. Related Requirements:
 - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for concrete mix information and use admixtures.
 - 2. Section 03 3543: 'Polished Concrete Finishing' for exposed interior concrete with polished, densified, clear or colored application.
 - 3. Section 03 3923: 'Membrane Concrete Curing' for curing application.
 - 4. Section 32 1723: 'Pavement Markings' for concrete pavement parking stripes.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference: Schedule pre-installation conference for same time as application of mockup application.
- B. Sequencing:
 - 1. Concrete Pavement:
 - a. Install Concrete Sealer before paint stripes are placed on concrete pavement.
 - b. Apply to prepared surfaces no sooner than about thirty (30) days after concrete placement.
 - c. Do not use concrete sealers to replace Membrane Concrete Curing.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Concrete Sealer:
 - 1) Manufacturer's product literature or cut-sheets for specified products.
- B. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Concrete Sealer: Written preparation and application instructions.
 - 2. Source Quality Control Submittals:
 - a. Provide protection plan of surrounding areas and non-work surfaces if requested by Architect/Owner's Representative.
 - 3. Qualification Statements:
 - a. Applicator: Provide qualification documentation.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Comply with applicable VOC standards and other local requirements.
- B. Qualifications:
 - 1. Applicator:
 - a. Applicator shall be acceptable to Manufacturer as applicator of its product.
 - b. Minimum five (5) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding. Include contact information of person with oversight of each project.
 - c. Provide qualification documentation.

1.5 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. Follow Manufacturer's written instructions for handling and storage of product:
 - a. Store in unopened containers in clean, dry area between 35 deg F and 110 deg F or as directed by Manufacturer's instruction.

1.6 FIELD CONDITIONS

- A. Follow printed Manufacturer's instructions.

PART 2 - PRODUCTS**2.1 PRODUCTS****A. Exterior Concrete Sealer:**

1. Description:
 - a. Concrete sealer that protects new and existing exterior concrete from freeze/thaw cycles and deicing salts.
2. Design Criteria:
 - a. General:
 - 1) Silane or linseed oil/mineral spirit concrete sealers are to be used.
 - 2) Siloxanes are not to be used to replace silane or linseed oil/mineral spirits sealers.
 - b. Linseed Oil/Mineral Spirits Sealers:
 - 1) Protects concrete from freeze/thaw cycles and deicing salts.
 - 2) Resists penetration of water and deicing salts.
 - c. Silane Based Sealers:
 - 1) Protects concrete from freeze/thaw cycles and deicing salts.
 - 2) Resists penetration of water and deicing salts.
 - 3) 100 percent silane active ingredient content.
 - 4) Penetrating sealer.
 - 5) Water repellent.
3. Type One Acceptable Products. See Section 01 6200 for definition of Categories. Applicator Option:
 - a. Linseed Oil/Mineral Spirits Sealers:
 - 1) Anti Spall J33 Concrete Sealer by Dayton Superior Corporation, Miamisburg, OH www.daytonsuperior.com.
 - a) Low VOC.
 - 2) Equal product meeting design criteria requirements as approved by Architect/Owner's Representative before BID. See Section 01 6200.
 - b. Silane Based Sealers:
 - 1) MasterProtect H 1000 by BASF, Cleveland, OH www.master-builders-solutions.basf.us.
 - a) Low VOC.
 - 2) Weather Worker J29A by Dayton Superior Corporation, Miamisburg, OH www.daytonsuperior.com.
 - 3) Baracade Silane 100 by Euclid, Cleveland, OH www.euclidchemical.com.
 - a) Low VOC.
 - 4) Sikagard 705L by Sika Corporation, Lyndhurst, NJ www.usa.sika.com.
 - a) Low VOC.
 - 5) TK-590-100 by TK Products, Minnetonka, MN www.tkproducts.com.
 - 6) Equal product meeting design criteria requirements as approved by Architect/Owner's Representative before BID. See Section 01 6200.

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

1. Verify concrete has properly cured.

3.2 PREPARATION**A. Surface Preparation:**

1. Concrete Sealer:
 - a. Take necessary precautions to protect adjoining property.
 - b. Do not contaminate any body of water by direct application, cleaning of equipment or disposal of wastes.
2. Cleaning:
 - a. Clean concrete surface of membrane curing and all dirt, mud spots, silt spots, loose material, vegetation, oil spots, and other objectionable and foreign material.
 - b. Remove debris, sand, dirt, and dust from concrete surface.
 - c. Power brooms, power blowers, air compressors, water flushing equipment, and blowers are acceptable equipment for cleaning concrete surface.

3.3 APPLICATION**A. Concrete Sealer:**

1. General:
 - a. Apply concrete sealer after surface preparation has been completed as per Manufacturer's recommendations.

- b. Follow Manufacturer's ambient conditions for minimum and maximum application temperatures and application precautions when rain is expected.
 - c. Stir material thoroughly before and during application if required by Manufacturer.
 - d. Do not apply sealer if standing water is visible on concrete surface to be treated.
 - e. Apply even distribution of sealer.
 - f. Do NOT over apply. All product should penetrate substrate with no surface build-up. Any excess or puddles of material must be removed.
2. Apply Concrete Sealer:
- a. Linseed Oil/Mineral Spirits Sealers:
 - 1) For maximum protection, apply onto concrete surface before it is exposed to deicing salts.
 - 2) Do not apply in temperatures below 40 deg F.
 - 3) Apply first coat at 1 gallon per 350 sq ft.
 - 4) When first coat is dry to touch, apply second coat at 1 gallon per 600 sq ft.
 - 5) When second coat is totally dry, surface is ready for traffic.
 - 6) Texture and absorption of surface will influence final coverage rates.
 - 7) This application will turn concrete to dark amber color.
 - b. Silane Based Sealers:
 - 1) Apply at rate of about 1 gallon per 300 sq ft or as per Manufacturer's recommendations depending upon absorbency of concrete surface.
3. Allow Concrete Sealer to dry as per Manufacturer's recommendations.

3.4 CLEANING

- A. General:
 - 1. Clean tools, equipment and spills as directed by Manufacturer's instructions.
 - 2. Clean drips and over spray while still wet.
- B. Waste Management:
 - 1. Sterilant/Concrete Sealers:
 - a. Follow Manufacturer's recommendations for approved disposal of product and containers.
 - 1) Do not reuse empty containers.

END OF SECTION

SECTION 03 3923
MEMBRANE CONCRETE CURING

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Quality of membrane concrete curing as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for application of membrane concrete curing.
 - 2. Section 03 3517: 'Concrete Sealer-Finishing' for application of concrete sealer.
 - 3. Section 32 1313: 'Concrete Paving'.

1.2 REFERENCES

- A. Definitions:
 - 1. Curing: Process by which hydraulic-cement concrete matures and develops hardened properties, over time, as result of continued hydration of cement in presence of sufficient water and heat. Also used to describe action taken to maintain moisture and temperature conditions in freshly placed concrete.
- B. Reference Standards:
 - 1. American Association of State and Highway Transportation Officials:
 - a. AASHTO M 148-05, 'Standard Specification for Liquid Membrane-Forming Compounds for Curing'.
 - 2. ASTM International:
 - a. ASTM C309-11, 'Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete'.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's product data.
 - b. Material Safety Data Sheets (MSDS).
- B. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Printed installation instructions.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Comply with applicable VOC standards and other local requirements.

1.5 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. Follow Manufacturer's written instructions for handling and storage of product:
 - a. Store in unopened containers in clean, dry area between 35 deg F and 110 deg F (Keep from freezing) or as directed by Manufacturer's instruction.
 - 2. Shelf Life: Do not use curing compound that is over one (1) year from manufacturer date.

1.6 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Do not apply curing compound when temperature of concrete is less than 40 deg F.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Membrane Concrete Curing:
 - 1. Description:
 - a. Clear water-based, ready-to use, dissipating membrane curing agent that cures freshly placed concrete, forming effective barrier against moisture loss from concrete surface.
 - 2. Design Criteria:
 - a. 28-day self dissipating.
 - b. VOC-compliant compound.
 - c. Meet requirements of ASTM C309 and AASHTO M 148, Type 1 or 1-D, Class B.
 - d. Interior concrete: containing no mineral spirits, naptha, or other components detrimental to finish flooring installation.
 - e. Maintain ninety-five (95) percent of mix water present in concrete mass after application.

- f. Gradually dissipate after twenty-eight (28) days without leaving stain or discoloring concrete surface.
- 3. Horizontal and Vertical Cast-In-Place Structural Concrete:
 - a. Type One Acceptable Products.
 - 1) Exterior and Interior Concrete:
 - a) Clear Cure J7WB by Dayton Superior Corporation, Miamisburg, OH www.daytonsuperior.com.
 - b) Clear Water Resin by Right Point, Dekalb, IL www.rightpointe.com.
 - c) L&M Cure R by L&M Construction Chemicals, Inc. Omaha, NE www.lmcc.com.
 - d) VOCOMP 20 (exterior concrete only, do not use when a concrete sealer will be applied in areas of freeze/thaw and deicer salts) by W.R. Meadows, Inc. Hampshire, IL www.wrmeadows.com.
 - e) 1100-Clear by W. R. Meadows, Inc. Hampshire, IL www.wrmeadows.com.
 - b. Equal product meeting design criteria requirements as approved by Architect/Owner's Representative before BID. See Section 01 6200.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 03 6213
NON-METALLIC NON-SHRINK GROUTING

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install structural grout as described in Contract Documents.
 - a. For grout base for structural columns.
 - b. For grout base for exterior light poles.
 - c. For grout base for machine bases.
 - d. For securing anchor bolts and hardware in concrete.
 - e. For securing anchor bolts and hardware in masonry.
- B. Related Requirements:
 - 1. Section 04 0516: 'Masonry Grouting'.

1.2 SUBMITTALS

- A. Action Submittals
 - 1. Product Data:
 - a. Manufacturer's data sheets on each product to be used, including:
 - 1) Preparation instructions and recommendations.
 - 2) Storage and handling requirements and recommendations.
 - 3) Manufacturer's printed installation instructions for each product.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Materials shall be delivered in original, unopened packages with labels intact clearly identifying product name and manufacturer until time of use.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Design Criteria:
 - 1. Description:
 - a. Commercial non-shrink, non-metallic grout.
 - 2. Meet following requirements:
 - a. ASTM C1107/C1107M, Type B or Type C.
 - b. Corps and Engineers CRD C-621.
 - c. Compressive strength of 6000 psi minimum.
- B. Type Two Acceptable Products:
 - 1. Masterflow 928 by BASF Systems, Shakopee, MN or BASF Canada, Mississauga, ON www.buildingsystems.basf.com.
 - 2. ProSpec F77 by Bonsal American, Inc., Charlotte, NC www.bonsal.com.
 - 3. Advantage 1107 Grout by Dayton Superior Corporation, Oregon, IL www.daytonsuperiorchemical.com.
 - 4. NS Grout by Euclid Chemical Company, Cleveland, OH www.euclidchemical.com.
 - 5. Five Star Grout by Five Star Products Inc, Fairfield, CT www.fivestarproducts.com.
 - 6. Duragrout by L&M Construction Chemicals Inc., Omaha, NE www.lmcc.com.
 - 7. Planigrout 712 by MAPEI Corporation, Deerfield Beach, FL www.mapei.US or Mapei Inc., Laval, QC www.mapei.com/CA.
 - 8. SikaGrout 212 by Sika Corporation, Lyndhurst, NJ www.usa.sika.com or Sika Canada, Inc. Pointe-Claire, QC www.can.sika.com.
 - 9. MP Grout by US Mix Products Company, Denver, CO www.usspec.com.
 - 10. Sealtight CG-86 Grout by W R Meadows, Hampshire, IL www.meadows.com.
 - 11. Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verification Of Conditions:
 - 1. Examine substrate and verify substrate is suitable for installation.
 - 2. Notify Architect of unsuitable conditions in writing.
 - a. Do not install board over unsuitable conditions.
 - b. Commencement of Work by installer is considered acceptance of substrate.

3.2 PREPARATION

- A. Surface Preparation:
 - 1. Prepare concrete surfaces in accordance with Manufacturer's written instructions:
 - 2. Remove all loose materials.

3. Clean surface of any substance that could interfere with bond on material including dirt, paint, tar, asphalt, wax, oil, grease, latex compounds, form release agents, laitance, loose toppings, foreign substances and any other residues.
4. Saturate area to be grouted with water in accordance with Manufacturer's written instructions.

3.3 APPLICATION

- A. General:
 1. Follow Manufacturer's recommended thickness.
- B. Mixing:
 1. Mix grout in accordance with Manufacturer's written instructions.
 2. Add mix water in amount in accordance with Manufacturer's written instructions to provide required placing consistency.
 3. Do not add water in amount that will cause bleeding or segregation of mixed grout.
 4. Do not add any sand, cement, admixtures, or fluidifiers to grout.
- C. Placement:
 1. Place grout in accordance with Manufacturer's written instruction including but not limited to the following:
 - a. Proper curing is required.
 - b. Use cold weather or hot weather grouting procedures in accordance with Manufacturer's written instructions, as temperature dictates:
 - 1) Do not use at temperatures that may cause premature freezing.
 - 2) Do not allow to freeze until 4000 psi is attained.
 - c. Employ cold weather or hot weather grouting practices as temperatures dictates.
 2. Completely eliminate air pockets and provide full contact between grout and item being grouted. Do not exceed Manufacturer's recommended thickness.
- D. Curing:
 1. Cure grout in accordance with Manufacturer's written instructions or ACI curing practices.
 2. Wet cure grout until forms are removed.
 3. Seal grout surfaces after forms are removed as recommended by Manufacturer.
- E. Keep grout surfaces wet after curing compound has dried for as long as recommended by Manufacture.

3.4 FIELD QUALITY CONTROL

- A. Field Inspections:
 1. Verify product has been installed as per Contract Documents and Manufacturer's written instructions.
- 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.

3.5 CLEANING

- A. Use clean water.
- B. Clean tools and equipment with water before material hardens.

3.6 PROTECTION

- A. Follow Manufacturer's recommendation for protection when applying material.
- B. Protect placed grout from freezing until minimum strength of 4000 psi is reached.
- C. Protect placed grout from damage during construction.

END OF SECTION

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DIVISION 04: MASONRY

04 0500 COMMON WORK RESULTS FOR MASONRY

- 04 0501 COMMON MASONRY REQUIREMENTS
- 04 0513 CEMENT AND LIME MASONRY MORTARING
- 04 0516 MASONRY GROUTING
- 04 0519 MASONRY ANCHORS AND INSERTS
- 04 0520 MASONRY REINFORCING

04 2000 UNIT MASONRY

- 04 2223 ARCHITECTURAL CONCRETE UNIT MASONRY

END OF TABLE OF CONTENTS

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**SECTION 04 0501
COMMON MASONRY REQUIREMENTS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Common requirements and procedures for Masonry including:
 - a. References.
 - b. Definitions.
 - c. Pre-Installation Conferences held jointly with masonry sections.
 - d. Joint backing for masonry control joints and masonry expansion joints.
- B. Related Requirements:
 - 1. Section 07 9213: 'Elastomeric Joint Sealants' used with masonry joints.
 - 2. Sections Under 04 0000 Heading: 'Masonry':
 - a. Pre-installation conference held jointly with other masonry related sections including:
 - 1) Section 04 0513: 'Cement and Lime Masonry Mortaring'.
 - 2) Section 04 0516: 'Masonry Grouting'.
 - 3) Section 04 0519: 'Masonry Anchors And Inserts'.
 - 4) Section 04 2223: 'Architectural Concrete Unit Masonry'.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate work with other trades with items to be built into masonry such as electrical switches and plumbing faucets.
- B. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100 held jointly with other Division 04 'Masonry' specifications in this Project that require pre-installation conferences:
 - a. Conduct conference at Project site.
 - b. Schedule pre-installation conference during construction of mockup panel.
 - 2. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review storage and handling requirements.
 - b. Review cold and hot weather procedure requirements.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: As specified in each masonry section.
 - 2. Samples: As specified in each masonry section.

1.4 QUALITY ASSURANCE

- A. Mockups:
 - 1. Masonry Sample Panel:
 - a. Sample panel 4 feet long by 3 feet high of proposed color range, texture, bond, mortar, and workmanship. Include mock-up framing and sheathing to show wall construction to be used on Project, including:
 - 1) Anchor and tie systems.
 - 2) Expansion joints if required on Project.
 - 3) Flexible flashing and required components at foundation.
 - 4) Seismic reinforcing.
 - b. Sample panel(s) shall be constructed using 'production run' material to be used on Project unless otherwise approved in writing by Architect and/or Owner.
 - c. Sample panel(s) to be used as standard of comparison for masonry work built of same material.
 - d. Sample panel(s) shall remain at jobsite until all masonry is completed.
 - e. Do not start work until Architect has accepted sample panel(s).
 - f. At Architect's direction, demolish mock-ups and remove debris.

1.5 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
 - 1. Check, carefully unload, and deliver material to site in such manner as to avoid soiling, damaging, or chipping.
 - 2. Do not use damaged masonry units, damaged components of structure, or damaged packaged materials.
 - 3. Masonry Accessories: Materials shall be delivered in original, unopened packages with labels intact.

B. Storage And Handling Requirements:

1. Aggregate:
 - a. Store different aggregates separately.
 - b. Store on high ground, or ideally, off ground to prevent contamination from dirt, organic materials and ground water, any of which may contribute to efflorescence and may be deleterious to mortar performance.
 - c. Store under protective cover to avoid saturation and freezing in cold weather.
2. Cementitious material:
 - a. Store in such manner as to prevent deterioration or intrusion of foreign material or moisture.
 - b. Do not use cementitious materials that have become contaminated.
 - c. Protect from precipitation and groundwater.
 - 1) Store materials on elevated platforms, under cover, and in dry location.
 - 2) Do not use cementitious materials that have become damp or has become unsuitable for good construction.
3. Masonry accessories:
 - a. Store masonry accessories clear of ground, including metal items, to prevent corrosion and contamination by dirt and ground water which may contain soluble salts and other matter which may contribute to efflorescence and staining.
 - b. Plastic and asphalt coated flashing material should not be stored in areas exposed to sunlight. During installation, flashing must be pliable so that no cracks occur at corners or bends.
 - c. Protect from damage until installation.
4. Masonry units:
 - a. Store materials protected from exposure to harmful weather conditions as directed by manufacturer.
 - b. Store material on planks clear of ground which may contain soluble salts and protect from damage, dirt, or disfigurement.
 - c. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof membrane, securely tied. If units become wet, do not install until they are dry.
5. Masonry Reinforcement:
 - a. Protect reinforcement, ties, and metal accessories from permanent distortions, elements and store off ground.

1.6 FIELD CONDITIONS**A. Ambient Conditions:**

1. Mortar:
 - a. Ideal mortar temperature is 70 deg F $\pm$ 10 deg F. Mixing temperature should be maintained within 10 deg F.
2. Cold Weather Requirements. Implement approved cold weather procedures and comply with requirements contained in TMS 602/ACI 530.1/ASCE 6 including but not limited to following:
 - a. Preparation requirements (prior to conducting masonry work):
 - 1) Do not lay masonry units having either temperature below 20 deg F or containing frozen moisture, visible ice, or snow on their surface.
 - 2) Do not use frozen materials or materials mixed or coated with ice or frost. Keep materials free of ice and snow. Do not lay masonry on frozen material. Remove and replace unit masonry damaged by frost or by freezing conditions.
 - 3) Remove visible ice and snow from top surface of existing foundations and masonry to receive new construction. Heat these surfaces above freezing, using methods that do not result in damage.
 - 4) Preparation of mortar.
 - b. Construction requirements (work in progress and based on ambient air temperature):
 - 1) Do not heat water or aggregates used in mortar or grout above 140 deg F. Comply with cold weather requirements for ambient air temperatures prior to conducting masonry work in accordance with TMS 402/ACI 530/ASCE 5-11 and TMS 602/ACI 530.1/ASCE 6.
3. Hot Weather Requirements. Implement approved hot weather procedures and comply with requirements contained in TMS 602/ACI 530.1/ASCE 6 including but limited to following:
 - a. Preparation (prior to conducting masonry work). Comply hot weather procedures when:
 - 1) Ambient air temperature exceeds 100 deg F, or exceeds 90 deg F with wind velocity greater than 8 mph

- 2) Ambient temperature exceeds 115 deg F, or exceeds 105 deg F with wind velocity greater than 8 mph.
- b. Construction requirements (work in progress). Comply hot weather procedures when prior to conducting masonry work in accordance with TMS 402/ACI 530/ASCE 5-11 and TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Masonry Control Joints (if shown on Contract Drawings):
 1. Description:
 - a. Extruded rubber or PVC.
 - b. Joint backing (backer rod).
 - c. Elastomeric joint sealant.
 2. Design Criteria:
 - a. Extruded Rubber:
 - 1) Meet requirements of ASTM D2000 2AA-805.
 - b. PVC:
 - 1) Meet requirements of ASTM D2287 (Type PVC 654-4) with durometer hardness of 85 (+ or -5) when tested in accordance with ASTM D2240.
 - c. Type One Acceptable Products:
 - 1) RS standard rubber control joint by Hohmann & Barnard.
 - 2) VS standard PVC control joint by Hohmann & Barnard.
 - 3) Equals as approved by Architect.
- B. Masonry Expansion Joints:
 1. Description:
 - a. Closed Cell Neoprene Sponge without tear strip placed horizontally beneath relieving angle, or in vertical expansion joint to act as control joint.
 - b. Joint backing (backer rod).
 - c. Elastomeric joint sealant.
 2. Design Criteria:
 - a. Extruded Rubber:
 - 1) Meet requirements of ASTM D1056 Grade 2A1.
 - b. Type One Acceptable Products:
 - 1) NS neoprene sponge by Hohmann & Barnard.
 - 2) Equals as approved by Architect.

END OF SECTION

**SECTION 04 0513
CEMENT AND LIME MASONRY MORTARING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Quality of masonry mortar used on Project.
- B. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
 - 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 3. Section 04 0501: 'Common Masonry Requirements'.
 - 4. Sections Under 04 2000 Heading: Furnish and install mortar.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100 held jointly with other Division 04 'Masonry' specifications in this Project that require pre-installation conference as specified in Section 04 0501: 'Common Masonry Requirements'.

1.3 SUBMITTALS

- A. Informational Submittals:
 - 1. Source Quality Control Submittals:
 - a. If pre-mixed wet mortar or pre-blended dry mortar mix are to be used, provide certification from Manufacturer or Supplier verifying that mixes meet specification requirements.
 - b. If site mixed / blended mortar is to be used, provide written description of proposed method of measuring and mixing of materials.
- 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 Inspecting Reports.

1.4 QUALITY ASSURANCE

- A. Testing And Inspection:
 - 1. As specified in Section 04 0501: 'Common Masonry Requirements'.

1.5 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
 - 1. As specified in Section 04 0501: 'Common Masonry Requirements'.
- B. Storage And Handling Requirements:
 - 1. Cementitious material:
 - a. As specified in Section 04 0501: 'Common Masonry Requirements'.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Design Criteria:
 - 1. Mixing:
 - a. Meet either proportion or property specifications of ASTM C270 for masonry mortar as per Table 3 'Proportion Specifications' and Table 4 'Physical Requirements for Masonry Cement Mortars'.
 - b. Conform with requirements of ASTM C780 and ASTM C1586.
 - c. Machine mixing should be used whenever possible.
 - 2. Mortar Minimum Compressive Strength at twenty-eight (28) days:
 - a. Type S: 1800 psi.
 - 1) Concrete Unit Masonry (CMU):
- B. Materials:
 - 1. Portland Cement:
 - a. Meet requirements of ASTM C150/C150M and ASTM C270.
 - 2. Hydrated Lime:
 - a. Meet requirements of ASTM C207 for hydrated lime.
 - 3. Aggregate:
 - a. Meet requirements of ASTM C144 and ASTM C270.
 - 4. Water:
 - a. Clean and free of acids, alkalis, and organic materials.

5. Admixtures:
 - a. Use no admixtures, except for color pigments specified below, without Architect's written permission. Use of any admixture to meet cold weather requirements and admixtures that increase air entrainment are expressly forbidden under all circumstances.
- C. Mixes:
 1. General:
 - a. Heat water and sand to 140 deg F maximum if temperature is below 40 deg F.
 2. Unit Masonry for mortar as specified in each Masonry specification section:
 - a. Proportions of ingredients in compliance with proportion specification of ASTM 270 using Portland cement.

PART 3 - EXECUTION**3.1 FIELD QUALITY CONTROL**

- A. Field Tests And Inspections:
 1. Field tests and inspection as specified in 04 0501: 'Common Masonry Requirements'.
 2. Sampling and testing of mortar is not required.

END OF SECTION

**SECTION 04 0516
MASONRY GROUTING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Quality of masonry grout used on Project.
- B. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
 - 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 3. Section 04 0501: 'Common Masonry Requirements'.
 - 4. Sections under 04 2000 heading: Furnish and install masonry grout.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100 held jointly with other Division 04 'Masonry' specifications in this Project that require pre-installation conference as specified in Section 04 0501.

1.3 SUBMITTALS

- A. Informational Submittals:
 - 1. Source Quality Control Submittals:
 - a. If pre-blended dry grout is to be used, provide certification from Manufacturer or Supplier verifying that mixes meet specification requirements.
 - b. If grout is to be mixed in field, provide written description of proposed procedure for measuring and mixing of materials.
- 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 Inspecting Reports.

1.4 QUALITY ASSURANCE

- A. Testing And Inspection:
 - 1. As specified in Section 04 0501.

1.5 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
 - 1. As specified in Section 04 0501.
- B. Storage And Handling Requirements:
 - 1. Cementitious material:
 - a. As specified in Section 04 0501.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Design Criteria:
 - 1. Provide grout that conforms to requirements of ASTM C476 and TMS 602/ACI 530.1/ASCE 6.
- B. Materials:
 - 1. Proportions of Ingredients:
 - a. Grout proportions shall be determined by one of following methods:
 - 1) As per ASTM C476 Table 1: 'Grout proportions by Volume' for fine and coarse grout.
 - 2) Specified Compressive Strength: Proportions established by twenty-eight (28) day compressive strength tests in accordance with Test Method ASTM C1019 that obtain specified compressive strength:
 - a) Grout shall be mixed to slump of 8 to 11 inches as determined by Test Method ASTM C143/C143M and shall have minimum compressive strength of 2000 psi at 28 days.
 - 2. Production Methods: Grout shall be produced using one of following procedures:
 - a. Materials mixed at job site:
 - 1) Individual cementitious materials and aggregates stored at job site shall be mixed in mechanical mixer for minimum of five (5) minutes with sufficient water to achieve desired consistency.

- 2) Individual dry ingredients transported to job site in suitable compartments shall be mixed with water at job site using continuous volumetric proportioning equipment to achieve desired consistency. Mix with auger of appropriate length to provide adequate mixing.
 - b. Mixed materials transported to job site:
 - 1) Factory dry-blended cementitious materials and aggregates delivered to job site shall be mixed in mechanical mixer for minimum of five (5) minutes with sufficient water to achieve desired consistency.
 - 2) Wet-mixed grout shall arrive at job site in ready-mixed condition. Slump shall be adjusted as necessary, and grout shall be re-mixed at mixing speed for at least one minutes before discharging to achieve desired consistency.
 - c. Grout may be hand mixed on small jobs with written approval of mixing procedure by Architect.
3. Portland Cement:
 - a. Meet requirements of ASTM C94/C94M, ASTM C150/C150M and ASTM C476.
 4. Aggregate:
 - a. Meet requirements of ASTM C144, ASTM C404, and ASTM C476.
 5. Water: Clean and potable free of acids, alkalis, and organic materials.
 6. Admixtures:
 - a. No additives are allowed which will increase air entrainment. Other additives may be used as approved in writing by Architect before use.
 7. Antifreeze Compounds:
 - a. No antifreeze liquids, salts or other substances shall be used in grout to lower freezing point.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
 1. Field tests and inspection as specified in 04 0501: 'Common Masonry Requirements'.

END OF SECTION

SECTION 04 0519
MASONRY ANCHORS AND INSERTS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Embedded Anchors for masonry.
 - 2. Post Installed Drilled Anchors for masonry:
 - a. Adhesive anchors and inserts.
 - b. Drilled-in mechanical anchors (expansion bolts).
 - c. Screw anchors.
 - 3. Masonry anchors and inserts not specified elsewhere.
- B. Related Requirements:
 - 1. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - 2. Section 01 4523: 'Testing and Inspecting Services' for post installed Drilled-In Anchor testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 3. Section 04 0501: 'Common Masonry Requirements' for installation of anchors and inserts.
 - 4. Section 04 0521: 'Masonry Veneer Ties'.
 - 5. Section 04 0523: 'Masonry Accessories'.
 - 6. Sections Under 04 2000 Heading: 'Unit Masonry' for masonry anchors and inserts used in Unit Masonry.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100 held jointly with other Division 04 'Masonry' specifications in this Project that require pre-installation conference as specified in Section 04 0501.
- B. Scheduling:
 - 1. Inspection shall be performed according to Manufacturer's submitted ICC ES Evaluation Report.
 - 2. Notify Testing Agency and Architect twenty-four (24) hours minimum before testing Post Installed Drilled Anchors. Coordinate testing schedule with mortar and grout as specified in Section 04 0501.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Post Installed Anchors:
 - 1) Manufacturer's product literature for each item.
- B. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. Post Installed Anchors:
 - 1) Provide current Manufacturer's applicable ICC ESR Evaluation Reports and ICC ES Acceptance Criteria showing conformance for each item.
 - 2. Manufacturer's Instructions:
 - a. Post Installed Anchors:
 - 1) Manufacturer's published installation instructions for each item.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Post Installed Anchors:
 - a) Testing Agency Inspecting Reports of Anchors.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer:
 - a. Having sufficient capacity to produce and deliver required materials without causing delay in work.
 - 2. Installer:
 - a. Acceptable to Manufacturer, experienced in performing work of this section and has specialized in installation of work similar to that required for this project.

- B. Testing and Inspection.
 - 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - 2. Owner will provide Testing and Inspection for Post Installed Anchors:
 - a. Owner will employ testing agencies to perform testing and inspection for anchors 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'.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
 - 1. Store materials protected from exposure to harmful weather conditions and as directed by manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Manufactured Units:
 - 1. General:
 - a. Use hot-dipped galvanized or stainless steel with matching nuts and washers in exterior and moist interior applications unless indicated otherwise on Drawings.
 - b. Nut: Conform to requirements of ASTM A563, Grade A, Hex.
 - c. Conform to requirements of ASTM F3125/F3125M for chemical, physical and mechanical requirements for quenched and tempered bolts manufactured from steel and alloy steel.
- B. Embedded Anchor Bolts:
 - 1. Class Two Quality Standard. See Section 01 6200 for definition.
 - a. Meet following design criteria requirements:
 - 1) Bent-bar Anchors: J and L-Bolts (threaded steel rods with hooks embedded into masonry):
 - a) Non-headed type threaded 2 inches minimum conforming to material requirements of ASTM A36/A36M.
 - b) Anchor hook to project 2 inch minimum including bolt diameter.
 - 2) Headed Bolts:
 - a) Headed type threaded 2 inch minimum conforming to requirements of ASTM A307, Grade A.
- C. Post Installed Anchors (Concrete Masonry Unit (CMS) and Hollow Brick Unit Masonry):
 - 1. Design Criteria:
 - a. Design loads are determined from testing minimum of five (5) specimens in accordance with ASTM E488 under stresses and conditions that represent intended use.
 - 1) Allowable stress design values are limited to twenty (20) percent of average tested anchor bolt strength.
 - 2) Using strength design provisions, nominal design strengths are limited to sixty-five (65) percent of average tested strength.
 - b. Effective embedment length: 2 inch minimum.
 - 2. Adhesive Anchors:
 - a. Cartridge Injection Adhesive Anchors.
 - b. Products shall have current ICC ES Evaluation report conforming to current ICC ES Acceptance Criteria ICC ES AC 58 for masonry.
 - c. Rod diameter and embedment length as indicated on Contract Drawings.
 - d. Type Two Acceptable Products:
 - 1) HIT-HY 70 by Hilti Fastening Systems, Tulsa, OK; www.us.hilti.com.
 - 2) SET Epoxy by Simpson Strong-Tie Co., Pleasanton, CA www.simpsonanchors.com.
 - 3) Equal as approved by Architect before installation. See Section 01 6200.
 - 3. Drilled-In Mechanical Anchors (Expansion Bolts):
 - a. Products shall have current ICC ES Evaluation report conforming to current ICC ES Acceptance Criteria ICC ES AC 01 for masonry.

- b. Type Two Acceptable Products:
 - 1) Kwik Bolt 3 by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
 - 2) Wedge-All by Simpson Strong-Tie Co., Pleasanton, CA www.simpsonanchors.com.
 - 3) Equal as approved by Architect before installation. See Section 01 6200.
- 4. Screw Anchors:
 - a. Provide anchors with length identification markings conforming to ICC ES AC 106 for masonry.
 - b. Type Two Acceptable Products:
 - 1) Titen HD by Simpson Strong Tie Co, Dublin, CA www.strongtie.com.
 - 2) Equal as approved by Architect through shop drawing submittal before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 - 1. Post Installed Anchors (Concrete Masonry Unit (CMS) and Hollow Brick Unit Masonry):
 - a. Base Material Strength:
 - 1) Unless otherwise specified, do not drill holes in masonry until mortar, or grout has achieved full design strength.
 - b. Identify position of reinforcing steel and other embedded items before drilling holes for anchors.
 - c. Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items.
 - d. Take precautions as necessary to avoid damaging, electrical and telecommunications conduit, and gas lines.
 - e. Notify Architect/Engineer if reinforcing steel or other embedded items are encountered during drilling.

3.2 PREPARATION

- A. Surface Preparation:
 - 1. Clean surfaces prior to installation.
 - 2. Prepare surface in accordance with Manufacturer's written instructions.

3.3 INSTALLATION

- A. Embedded Anchor Bolts:
 - 1. Embed Headed and J Bolts larger than 1/4 inch diameter in grout that is placed in accordance with 'Grout Placement' as specified in Installation requirements in Part 3 of this specification. Anchor bolts of 1/4 inch diameter or less are permitted to be placed in grout.
 - 2. For anchor bolts placed in top of grouted cells and bond beams, maintain clear distance between bolt and face of masonry unit of at least 1/4 inch when using fine grout and at least 1/2 inch when using coarse grout.
 - 3. For anchor bolts placed through face shell of hollow masonry unit, drill hole that is tight-fitting to bolt or provide minimum clear distance:
 - 4. For portion of bolt that is within grouted cell, maintain clear distance between bolt and face of masonry unit and between head or bent leg of bolt and formed surface of grout of at least 1/4 inch (6.4 mm) when using fine grout and at least 1/2 inch when using coarse grout.
 - 5. Place anchor bolts with clear distance between parallel anchor bolts not less than nominal diameter of anchor bolt, nor less than 1 inch.
- B. Post Installed Anchors (Concrete Masonry Unit (CMS) and Hollow Brick Unit Masonry):
 - 1. General:
 - a. Drill holes with rotary impact hammer drills using carbide-tipped bits or core drills using diamond core bits.
 - b. Unless otherwise shown on Contract Drawings, drill holes perpendicular to masonry surface.
 - c. Where anchors are to be installed in cored holes, use core bits with matched tolerances specified by Manufacturer. Cored holes may only be used if acceptable to Manufacturer.
 - d. Perform anchor installation in accordance with Manufacturer's published instructions.
 - 2. Adhesive Anchors:
 - a. Clean holes in accordance with Manufacturer's published instructions before installation of adhesive. Follow Manufacturer's instructions to ensure proper mixing of adhesive components.

- b. Inject adhesive into holes proceeding from bottom of hole and progressing toward surface so as to avoid introduction of air pockets into adhesive. Inject sufficient adhesive into hole to ensure that annular gap is filled to surface.
 - c. Remove excess adhesive from surface.
 - d. Shim anchors with suitable device to center anchor in hole. Do not disturb or load anchors before Manufacturer's specified cure time has elapsed.
 - e. Observe Manufacturer's instructions with respect to installation temperatures for adhesive anchors. Base material temperatures must be maintained above minimum temperatures allowed by Manufacturer for full required epoxy cure time.
3. Drilled-in Mechanical Anchors (Expansion Bolts):
 - a. Protect threads from damage during anchor installation.
 - b. Set anchors to Manufacturer's recommended torque, using torque wrench. Following attainment of ten (10) percent of specified torque, one hundred (100) percent of specified torque shall be reached within 7 or fewer complete turns of nut. If specified torque is not achieved within required number of turns, remove and replace anchor, unless otherwise directed by Architect.
4. Screw Anchors:
 - a. Protect threads from damage during anchor installation.
 - b. Set anchors to Manufacturer's recommended torque, using torque wrench.

3.4 FIELD QUALITY CONTROL

A. Field Tests and Inspections:

1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor.
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
 - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
2. Post Installed Anchors (Concrete Masonry Unit (CMS) and Hollow Brick Unit Masonry):
 - a. Certified Inspector from Testing Agency shall verify procedures used for installation of all post installed anchors and monitor their installation for compliance with manufacturer's requirements.
 - b. Testing: Ten (10) percent of each type and size of drilled-in anchor shall be proof loaded by Testing Agency's testing laboratory or as directed by Architect. Adhesive anchors will not be torque tested unless otherwise directed by Architect. If more than ten (10) percent of tested anchors fail to achieve specified torque or proof load within limits defined on Drawings, all anchors of same diameter and type as failed anchors shall be tested at Contractors expense, unless otherwise instructed by Architect.
 - 1) Torque will be applied with calibrated torque wrench.
 - 2) Proof loads will be applied with calibrated hydraulic ram. Displacement of adhesive anchors at proof load shall not exceed $D/10$, where D is nominal anchor diameter.

B. Non-Conforming Work:

1. Remove and replace misplaced or malfunctioning anchors.
2. Fill empty anchor holes and patch failed anchor locations with high-strength, non-shrink, non-metallic grout acceptable to Architect.
3. Anchors that fail to meet proof load or installation torque requirements will be regarded as malfunctioning.
4. Repair damage to adjacent materials caused by product installation.

3.5 CLEANING

A. Waste Management:

1. Disposal of rubbish, debris, and packaging materials.

3.6 PROTECTION

A. General:

1. Protect installed products from damage during construction.

END OF SECTION

**SECTION 04 0520
MASONRY REINFORCING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Masonry horizontal joint reinforcing.
 - 2. Steel reinforcing bars.
- B. Related Requirements:
 - 1. Sections under Division 03 'Concrete' for placement of dowels out of foundations for masonry reinforcing.
 - 2. Section 04 0501: 'Common Masonry Requirements' for installation of masonry reinforcing.
 - 3. Sections under 04 2000 Heading: 'Unit Masonry' for masonry units using masonry reinforcing.

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Certificates:
 - a. Mill certificate.
 - 2. Fabricator Instructions:
 - a. Reinforcing bar placement drawings.

1.3 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
 - 1. Steel reinforcing bars shall be free of heavy rust scales and flakes, and other bond-reducing coatings at time of delivery and placing.
 - 2. Separate steel reinforcing bars by size and tag with manufacturer's heat or test identification number.
 - 3. Tag continuous joint reinforcing with Manufacturer's name, wire size, and ASTM / CSA specification.
- B. Storage And Handling Requirements:
 - 1. Properly protect reinforcing on site after delivery.

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Manufacturers:
 - 1. Manufacturers Contact List:
 - a. Heckman Building Products Inc, Chicago, IL www.heckmannbuildingprods.com.
 - b. Hohmann & Barnard, Hauppauge, NY www.h-b.com.
 - c. Masonry Reinforcing Corporation of America, Charlotte, NC www.wirebond.com.
- B. Materials:
 - 1. Design Criteria:
 - a. Steel Reinforcing Bars:
 - 1) Steel reinforcing bars shall have grade identification marks and meet requirements of ASTM A615/A615M, Grade 60 minimum. All but No. 2 bars shall be deformed type.
 - b. Cold-drawn steel conforming to ASTM A1064/A1064M.
 - c. Continuous Joint Reinforcing:
 - 1) Conform to ASTM A1064/A1064M. Exterior wall reinforcing shall be galvanized to meet requirements of ASTM A153/A153M, Class B-2. Interior wall reinforcing shall be galvanized to meet requirements of ASTM A1064/A1064M, Class A.
 - 2) Size: 2 inches less than nominal thickness of wall.
 - 3) Rod Size:
 - a) Side rods: 9 gauge or 3/16 inch diameter.
 - b) Cross rods: 9 gauge or 3/16 inch diameter.
 - 4) Cross rods that serve as metal ties in exterior cavity and other multi-wythe walls shall be drip crimped.
 - 5) Corners And Tee Sections: Prefabricated of material and design similar to main reinforcement.
 - d. Finish: Hot-dipped galvanized as per ASTM A153/A153M (1.5 oz/ft² after fabrication).
 - 2. Multi-Wythe Masonry:
 - a. Where bed joints of wythes align, use joint reinforcing extending across wythes.
 - 1) Prefabricated joint reinforcement for embedment in horizontal mortar joints tying multi-wythe masonry walls together.

- b. Where bed joints of wythes do not align, use:
 - 1) Type Two Acceptable Products. See Section 01 6200:
 - a) No. 170-2X S.I.S. Truss Eye-Wire Adjustable Truss Eye-Wire w/2X-Hook & Seismiclip Interlock System by Hohmann & Barnard.
 - b) No. 270-2X-SH Ladder adjustable reinforcement with 2X-Seismic Hook by Hohmann & Barnard.
 - c) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.
- 3. Single-Wythe Masonry:
 - a. Description:
 - 1) Prefabricated reinforcement for embedment in horizontal mortar joints if Contract Drawings.
 - b. Type Two Acceptable Products. See Section 01 6200:
 - 1) No. 120 Truss-Mesh by Hohmann & Barnard.
 - 2) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.
- C. Fabrication:
 - 1. Fabricate and bend steel reinforcing bars according to 'ACI Detailing Manual' (2004 edition or latest available) and as detailed on Contract Drawings.
 - 2. Reinforcement:
 - a. Fabricate reinforcing bars in accordance with fabricating tolerances of ACI 117.
 - b. Bend bars cold and do not heat bars.
 - c. Do not bend Grade 40 bars in excess of 180 degrees. Minimum inside diameter of bend is five bar diameters.
 - d. Minimum inside bend diameter for other bars is as follows:
 - 1) No. 2 through No. 8 (M #10 through M #25): 6 bar diameters.
 - 2) No. 9 through No. 11 (M #29 through M #36): 8 bar diameters.
 - e. Provide standard hooks that conform to following:
 - 1) Standard 180-degree hook: 180-degree bend plus minimum extension of 4 bar diameters or 2-1/2 inch, whichever is greater.
 - 2) Standard 90-degree hook: 90-degree bend plus minimum extension of 12 bar diameters.
 - 3) For stirrups and tie hooks for No. 5 (M #16) bar and smaller: 90-degree or 135-degree bend plus minimum of 6 bar diameters or 2-1/2 inch, whichever is greater.

2.2 ACCESSORIES

- A. Rebar Positioners (Used with structural CMU construction):
 - 1. Design Criteria:
 - a. Position rebar vertically in cell of CMU.
 - b. Cold-drawn steel conforming to ASTM A1064/A1064M.
 - c. Wire diameter: 9 gauge.
 - d. Finish: Hot-dipped galvanized as per ASTM A153/A153M (1.5 oz/ft .
 - 2. Class One Quality Standards:
 - a. Single Curtain: No. RB Rebar Positioners by Hohmann & Barnard.
 - b. Double Curtain: No. RB-Twin Rebar Positioners by Hohmann & Barnard.
 - 3. Type Two Acceptable Manufacturers. See Section 01 6200:
 - a. Heckman Building Products Inc, Chicago, IL www.heckmannbuildingprods.com.
 - b. Hohmann & Barnard, Hauppauge, NY www.h-b.com.
 - c. Masonry Reinforcing Corporation of America, Charlotte, NC www.wirebond.com.
 - d. Equal meeting Design Criteria as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work:
 - 1. Coordinate with Division 03 'Concrete'.
- B. Reinforcement
 - 1. Basic requirements:
 - a. Place reinforcement in accordance with the sizes, types, and locations indicated on Contract Drawings and as specified.
 - b. Do not place dissimilar metals in contact with each other.
 - c. Reinforcing shall be free of material that may destroy bond.

- d. Dowel vertical reinforcing bars out of structure below with bars of same size and spacing
- e. Support reinforcement to prevent displacement caused by construction loads or by placement of grout or mortar, beyond allowable tolerances.
- f. Unless accepted by Architect, do not bend reinforcement after it is embedded in grout or mortar.
- g. Brick Veneer Unit Masonry:
 - 1) Attach joint reinforcing to brick veneer ties in accordance with Manufacturer's instructions.
2. Placing Reinforcement:
 - a. Completely embed reinforcing bars in grout in accordance with 'Grout Placement' as specified in Installation requirements in Part 3 of Section 04 0501: 'Common Masonry Requirements'.
 - b. Dowel vertical reinforcing bars out of structure below with bars of same size and spacing.
 - c. Maintain clear distance between reinforcing bars and interior of masonry unit or formed surface of at least 1/4 inch for fine grout and 1/2 inch for coarse grout,
 - d. Place reinforcing bars maintaining the following minimum cover:
 - 1) Masonry face exposed to earth or weather:
 - a) 2 inch for bars larger than No. 5 (M #16).
 - b) 1-1/2 inch for No. 5 (M #16) bars or smaller.
 - e. Maintain minimum clear distance between parallel bars of the nominal bar size or 1 inch, whichever is greater.
 - f. In columns and pilasters, maintain minimum clear distance between vertical bars of one and one-half times nominal bar size or 1-1/2 inch, whichever is greater.
 - g. Continue bond beam units and reinforcement uninterrupted around corners and across wall intersections. See Contract Drawings.
3. Splicing:
 - a. Splice reinforcing steel as shown on Contract Drawings.
 - b. Noncontact lap splices: Position bars spliced by noncontact lap splice no farther apart transversely than one-fifth specified length of lap nor more than 8 inch.
4. Rebar Positioners:
 - a. Before grouting, secure masonry reinforcing steel in place before grouting with rebar positioners at top of first course and bottom of top course minimum.
 - b. Install intermediary positioners for every 192 bar diameters maximum between positioners.
 - c. Locate intermediary positioners with approximately equidistant spacing in wall when number required has been determined.
5. Joint Reinforcement (Single-Wythe Unit Masonry):
 - a. Beginning approximately 8 inch from base of masonry, provide joint reinforcing 16 inches on center vertically, except 8 inch on center if drip crimped unless noted otherwise in Contract Drawings.
 - b. Place joint reinforcement so that longitudinal wires are embedded in mortar with minimum cover of 1/2 inch when not exposed to weather or earth; or 5/8 inch when exposed to weather or earth.
 - c. Provide minimum 6 inch lap splices for joint reinforcement.
 - d. Ensure that all ends of longitudinal wires of joint reinforcement at laps are embedded in mortar or grout.
6. Placement tolerances:
 - a. Place reinforcing bars in walls and flexural elements within tolerance of $\pm 1/2$ inch when:
 - 1) Distance from centerline of reinforcing bars to opposite face of masonry is equal to 8 inch or less.
 - 2) ± 1 inch for centerline of reinforcing bars to opposite face of masonry equal to 24 inch or less but greater than 8 inch.
 - 3) $\pm 1-1/4$ inch for centerline of reinforcing bars to opposite face of masonry greater than 24 inch.
 - b. Place vertical bar within:
 - 1) 2 inch of required location along length of wall when wall segment length exceeds 24 inch.
 - 2) 1 inch of required location along length of wall when wall segment length does not exceed 24 inch.

- c. If it is necessary to move bars more than one (1) bar diameter or distance exceeding tolerance stated above to avoid interference with other reinforcing steel, conduits, or embedded items, notify Architect for acceptance of resulting arrangement of bars.
- d. Foundation dowels that interfere with unit webs are permitted to be bent to maximum of 1 inch horizontally for every 6 inch of vertical height.

3.2 CLEANING

A. Waste Management:

- 1. Disposal of rubbish, debris, and packaging materials.

END OF SECTION

SECTION 04 2223
ARCHITECTURAL CONCRETE UNIT MASONRY

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install architectural concrete unit masonry as described in Contract Documents.
 - 2. Furnish and install anchor bolts and embedded anchors as described in Contract Documents.
 - 3. Grout door frames installed in CMU walls.
- B. Products Installed But Not Furnished Under This Section:
 - 1. Anchor bolts.
 - 2. Door frames.
 - 3. Elastomeric joint sealants.
 - 4. Grout.
 - 5. Metal lintels.
 - 6. Mortar.
 - 7. Reinforcement bars.
 - 8. Reglets.
- C. Related Requirements:
 - 1. Section 03 2100: 'Reinforcement Bars'.
 - 2. Section 04 0501: 'Common Masonry Requirements' for:
 - a. Common masonry requirements and procedures.
 - b. Pre-installation conference held jointly with other masonry related sections.
 - 3. Section 04 0513: 'Cement and Lime Masonry Mortaring' for quality of mortar.
 - 4. Section 04 0516: 'Masonry Grouting' for quality of grout.
 - 5. Section 04 0519: 'Masonry Anchors and Inserts' for anchor bolts used in masonry.
 - 6. Section 05 1223: 'Structural Steel For Buildings' for metal Lintels.
 - 7. Section 07 1900: 'Water Repellent' for sealing masonry after cleaning.
 - 8. Section 07 7126: 'Reglets'.
 - 9. Section 07 9213: 'Elastomeric Joint Sealants'.
 - 10. Section 08 1213: 'Hollow Metal Frames' for door frames.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100 held jointly with other Division 04 'Masonry' specifications in this Project that require pre-installation conference as specified in Section 04 0501.

1.3 SUBMITTALS

- A. Informational Submittals:
 - 1. Certificates:
 - a. Prior to construction, certificates for materials used in masonry construction indicating compliance with contract documents are to be submitted. This is "Unit Strength Method" approach.
 - 2. Source Quality Control Submittals:
 - a. Manufacturer's certification that units meet compressive strength specified requirements.
- 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.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
 - a. Minimum of five (5) years' experience on successfully completed projects of similar nature.
- B. Testing And Inspection:
 - 1. As specified in Section 04 0501: 'Common Masonry Requirements'.

1.5 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
 - 1. As specified in Section 04 0501: 'Common Masonry Requirements'.
- B. Storage And Handling Requirements:
 - 1. Aggregate, Cementitious Material, Masonry Accessories, Masonry Units, and Reinforcement:
 - a. As specified in Section 04 0501: 'Common Masonry Requirements'.

1.6 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Cold Weather and Hot Weather Limitations:
 - a. As specified in Section 04 0501: 'Common Masonry Requirements'.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Design Criteria:
 - 1. Minimum Compressive Strength of 2000 psi.
- B. Materials:
 - 1. Mortar: Type 'S' mortar as specified in Section 04 0513: 'Cement and Lime Masonry Mortaring'.
 - 2. Concrete Masonry Units:
 - a. Design Criteria:
 - 1) Meet requirements of ASTM C90, lightweight classification:
 - a) 85 lbs per cu ft minimum weight classification.
 - b) Lightweight aggregates conforming to ASTM C331/C331M.
 - c) Do not use re-crushed masonry units as aggregate.
 - 2) Outside Corners: Square-edged, except where bull nose is indicated on Contract Drawings.
 - 3) Use special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, etc, as required.
 - 4) Uniform color and textures with unbroken edges. Smooth face, except where shown otherwise on Contract Drawings.

2.2 ACCESSORIES

- A. Construction Cleaning Compounds:
 - 1. Type Two Acceptable Products:
 - a. 202 or 202V by Diedrich Technologies, Oak Creek, WI www.diedrichtechnologies.com.
 - b. Surekleen No. 600 or Vana-Trol by ProSoCo Inc, Kansas City, KS www.prosoco.com.
 - c. Equal as approved by Architect before use. See Section 01 6200.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verification Of Conditions:
 - 1. Verify substrates have been properly prepared.
 - 2. Verify built-in items are in proper location, and ready for roughing into masonry.
 - 3. Notify Architect of any unsatisfactory preparation before proceeding.
 - a. Do not install masonry over unsuitable conditions.
 - b. Commencement of Work by installer is considered acceptance of substrate.

3.2 PREPARATION

- A. Coordinate placement of reinforcement, anchors and accessories, flashings and weep holes and other moisture control products specified in other sections.
- B. Prior to placing masonry:
 - 1. Clean reinforcement by removing mud, oil, or other materials that will adversely affect or reduce bond at time mortar or grout is placed.
 - 2. Remove laitance, loose aggregate, and anything else that would prevent mortar from bonding to foundation.
- C. Wetting Masonry Units:
 - 1. Concrete masonry:
 - a. Do not wet concrete masonry units before laying. Wet cutting is permitted.
- D. Reinforcement:
 - 1. Place reinforcement and ties in grout spaces prior to grouting.
- E. Provide temporary bracing during installation of masonry work:
 - 1. Design, provide, and install bracing that will assure stability of masonry during construction.
 - 2. Maintain bracing in place until building structure provides permanent support.

3.3 INSTALLATION

- A. Interface With Other Work:
 - 1. Masonry Cutting:
 - a. Make cuts proper size to accommodate work of other trades.
 - b. Cut openings for electrical devices using cover plates no larger than can be covered by standard size plate.
 - c. Replace unit masonry in which larger than necessary openings are cut.
 - d. Do not patch openings with mortar or other material.

- B. General:
 - 1. Cold Weather and Hot Weather Limitations:
 - a. Place grout and mortar as specified in Section 04 0501: 'Common Masonry Requirements'.
 - 2. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
 - 3. Step back unfinished work for joining with new work. Use toothing only with Architect's approval.
 - 4. Built-In Work:
 - a. As work progresses, install masonry flashings and weep holes and other built-in work specified in other sections.
- C. Tolerances:
 - 1. Masonry work shall be true to vertical and horizontal planes within 1/8 inch in 10 feet, non-cumulative.
 - 2. Maintain 3/8 inch mortar joints throughout.
 - 3. Grout space or cavity width, except for masonry walls passing framed construction: minus 1/4 inch, plus 3/8 inch .
- D. Mortar:
 - 1. Use mortar within two (2) hours of initial mixing. Discard mortar that has begun to set. Set masonry units within one (1) minute of spreading mortar.
 - 2. Do not allow mortar build-up in cavity between brick veneer and Concrete Masonry Units (CMU).
- E. Grouting:
 - 1. General:
 - a. Provide grout that conforms to requirements as specified in Section 04 0516: 'Masonry Grouting'.
 - b. Use fine grout for cavities 2 inches and smaller in smallest dimension. Use coarse grout for cavities greater than 2 inches in smallest dimension.
 - c. Grout hollow metal door frames installed in masonry walls solid.
 - d. Provide grout-leveling bed for support of wall plates.
 - 2. Concrete Masonry Units:
 - a. Fully grout all cells.
 - b. Consolidate grout by means of mechanical vibrator. Do not use cell reinforcing to rod grout.
 - c. Before loss of plasticity, mechanically reconsolidate grout.
 - 3. Placing time:
 - a. Place grout within 1-1/2 inches introducing water in the mixture and prior to initial set:
 - 1) Discard site-mixed grout that does not meet specified slump without adding water after initial mixing.
 - 2) For ready-mixed grout:
 - a) Addition of water is permitted at time of discharge to adjust slump.
 - b) Discard ready-mixed grout that does not meet specified slump without adding water, other than water that was added at time of discharge.
 - c) Time limitation is waived as long as ready-mixed grout meets specified slump.
 - 4. Confinement:
 - a. Confine grout to areas indicated on Contract Drawings. Use material to confine grout that permits bond between masonry units and mortar.
 - 5. Grout Pour Height:
 - a. Place grout in 48 inch maximum lifts.
 - 6. Consolidation:
 - a. Consolidate grout at the time of placement:
 - 1) Consolidate grout at time of placement in height by mechanical vibration or by puddling.
 - 2) Consolidate pours exceeding 12 inch in height by mechanical vibration, and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.
 - b. Consolidation or reconsolidation is not required for self-consolidating grout.
 - 7. Grout Key:
 - a. When grouting, form grout keys between grout pours. Form grout keys between grout lifts when first lift is permitted to set prior to placement of subsequent lift:
 - 1) Form grout key by terminating grout minimum of 1-1/2 inch below mortar joint.
 - 2) Do not form grout keys within beams.
 - 3) At beams or lintels laid with closed bottom units, terminate grout pour at bottom of beam or lintel without forming grout key.

- F. Laying:
 - 1. Layout:
 - a. Running bond except where indicated otherwise.
 - 2. Joints:
 - a. Tool concave. Fill completely except where indicated differently.
 - b. Do not tool until mortar has taken initial set.
 - c. Point holes in joints. Fill and tool properly.
 - 3. Concrete Masonry Units:
 - a. Lay hollow masonry units dry. Do not lay masonry on frozen material.
 - b. Place hollow units so:
 - 1) Face shells of bed joints are fully mortared.
 - 2) Webs are fully mortared in all courses of piers, columns and pilasters and when necessary to confine grout or insulation.
 - 3) Head joints are mortared, minimum distance from each face equal to face shell thickness of unit.
 - 4) Vertical cells to be grouted are aligned and unobstructed openings for grout are provided in accordance with Contract Drawings.
 - c. Align cells or cavities to preserve unobstructed cavity for grouting:
 - 1) Do not allow excess mortar to block cells.
 - 2) Full bedding required on both webs and face shell under first course. Other courses need only face shell bedding except where bedding is needed to control flow of grout.
- G. Reinforcing:
 - 1. Reinforcing shall be free of material that may destroy bond.
 - 2. Continuous Joint Reinforcing:
 - a. Beginning approximately 8 inches from base of masonry, provide joint reinforcing 16 inches on center vertically, except 8 inches on center if drip crimped.
 - b. Maximum offset between brick and block coursing is 1-1/4 inch using ladder adjustable-wire reinforcement or ladder adjustable-wire reinforcement with seismic hook type reinforcing. If brick and block coursing is exactly lined up, ladder adjustable-wire reinforcing may be used. However, such reinforcing may not be bent to fit coursing that does not line up.
 - c. Lap splices and intersections minimum of 6 inches.
 - 3. Reinforcing:
 - a. Place steel as shown on Contract Drawings.
 - b. Splice 48 bar diameters minimum.
 - c. Dowel vertical reinforcing bars out of structure below with bars of same size and spacing.
 - d. Place horizontal bars in 8 inch deep bond beam units at top of wall and at 48 inches on center between. Continue bond beam units and reinforcement uninterrupted around corners and across wall intersections.
 - e. Place special vertical bars of same size as normal vertical reinforcement at corners and jambs of openings and recesses where bond beams are interrupted and at beam bearing locations not otherwise detailed.
 - f. Unless detailed otherwise, place special horizontal bars of same size as normal reinforcing above and below openings. Extend bars 24 inches minimum beyond opening.
 - 4. Rebar Positioners:
 - a. Before grouting, secure masonry reinforcing steel in place with rebar positioners at top of first course and bottom of top course minimum.
 - b. Install intermediary positioners for every 192 bar diameters maximum between positioners.
 - c. Locate intermediary positioners with approximately equidistant spacing in wall when number required has been determined.
- H. Embedded items and accessories:
 - 1. Install embedded items and accessories as follows:
 - a. Construct chases as masonry units are laid.
 - b. Install pipes and conduits passing horizontally through masonry partitions.
 - c. Place pipes and conduits passing horizontally through piers, pilasters, or columns.
 - d. Place horizontal pipes and conduits in and parallel to plane of walls.
 - e. Install and secure connectors, flashing, weep holes, weep vents, nailing blocks, and other accessories.
 - f. Install movement (control and expansion) joints.
 - g. Provide control joints as shown on Contract Drawings if included for Project.

- h. Aluminum:
 - 1) Do not embed aluminum conduits, pipes, and accessories in masonry, grout, or mortar, unless they are effectively coated or isolated to prevent chemical reaction between aluminum and cement or electrolytic action between aluminum and steel.

3.4 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Unit Masonry:

- a. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - 1) Quality Control is sole responsibility of Contractor.
 - a) 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.
- b. Masonry (Masonry Prisms, Masonry Units, Reinforcement, Mortar and Grout):
 - 1) Testing and Inspections shall conform to IBC Section 17 'Special Inspections And Tests' and in accordance with Chapter 3 'Quality And Construction' of TMS 402/ACI 530.1/ASCE 5 (Building Code Requirements for Masonry Structures) and TMS 602/ACI 530.1/ASCE 6 (Specification for Masonry Structures):
 - a) Quality assurance program shall comply with requirements of Chapter 3, for Level A 'Quality Assurance' for Risk Category I, II, or III structures or Level B 'Quality Assurance' for Risk Category IV structures and as defined in ASCE 7 or latest approved adopted building code. See Structural Design Criteria as shown on Contract Documents.

B. Non-Conforming Work:

- 1. Remove and replace defective material at Architect's direction and at no additional cost to Owner.

3.5 CLEANING

A. General:

- 1. Clean exposed masonry surfaces of stains, efflorescence, mortar and grout droppings, and debris using methods that do not damage masonry.
- 2. After mortar has hardened, wet masonry and clean with specified cleaning compound. Use stiff fibered brush for application. Rinse masonry surfaces with water immediately after cleaning. Leave masonry clean, free of mortar daubs, and with tight mortar joints.
- 3. Wash adjacent non-masonry surfaces. Use detergent and soft brushes or cloth.
- 4. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

B. Waste Management:

- 1. Unit Masonry:
 - a. Clean up masonry debris and remove from site.

3.6 PROTECTION

A. General:

- 1. Brace masonry walls until walls attain adequate strength and are tied into building structure.
- 2. Do not allow structural loading of masonry walls until walls attain adequate strength.
- 3. During construction, all walls should be kept dry by covering top of wall with strong, water-resistant membrane at end of each day or shutdown period. Covering should overhang wall by at least 24 inches on each side, and should be secured against wind.
- 4. Covering should remain in place until top of cavity wall is completed or protected by adjacent materials.
- 5. Protect masonry with covering during rainy weather.

B. Cold Weather Requirements:

- 1. In cold weather, all materials and walls should be properly protected against freezing including storing of materials, preparation of mortar, heating of masonry units, laying precautions, and protection of Work.
- 2. Remove all masonry deemed frozen or damaged.

END OF SECTION

DIVISION 05: METALS

05 0500 COMMON WORK RESULTS OF METALS

05 0503 SHOP-APPLIED METAL COATINGS

05 0523 METAL FASTENINGS

05 1000 STRUCTURAL METAL FRAMING

05 1200 STRUCTURAL STEEL FRAMING

05 1223 STRUCTURAL STEEL FOR BUILDINGS

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SECTION 05 0503
SHOP-APPLIED METAL COATINGS

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in pre-installation conference.
 - 2. In addition to requirements of Section 01 3100, review following:
 - a. Meet with Architect before commencing repair of galvanized surfaces to establish extent of repairs required and, if applicable, choice of methods to be used.

1.3 SUBMITTALS

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

PART 2 - PRODUCTS**2.1 FINISHES**

- A. Factory And Shop-Applied Primer:
 - 1. Compatible with and of equal or better quality than finish paint system to be applied by Sections under 09 9000 heading.
 - 2. Primer on unexposed, unfinished surfaces may be fabricator's standard shop coat.
- B. Repairs To Primed Surface:
- C. Unless otherwise specified, use primer which matches characteristics of original primer and is compatible with and of equal or better quality than finish paint system to be applied by Sections under 09 9000 heading.
- D. Material For Repairs Of Galvanized Surfaces:
 - 1. Non-Structural, Non-Load-Bearing Items Not Exposed To Weather:
 - a. Zinc-Rich Paints:
 - 1) Zinc-Dust Content: Dried film shall contain 94 percent minimum of zinc-dust by weight.
 - 2) Type One Acceptable Manufacturers:
 - a) Galvax by Alvin Products Inc, Everett, MA www.alvinproducts.com.
 - b) ZRC Galviline by ZRC Worldwide, Marshfield, MA www.zrcworldwide.com.
 - c) Equal as approved by Architect before bidding. See Section 01 6200.
 - 2. Structural, Load-Bearing Items And Items Exposed To Weather:
 - a. Zinc-Based Solders, Powder, Or Rod:
 - 1) Zinc-Cadmium solder with liquidus temperature range from 518 to 527 deg F, or
 - 2) Zinc-Tin-Lead alloy with liquidus temperature range from 446 to 500 deg F .
 - b. Sprayed Zinc: Wire, ribbon, or powdered zinc suitable for process.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Surface Preparation:
 - 1. General:
 - a. Clean, grind, or otherwise prepare welds in steel that is to be coated within limits acceptable to welder responsible for structural integrity.
 - b. Surfaces to be coated shall be clean, dry and free of oil, grease, and corrosion products.
 - 2. Preparation Of Primed, Ungalvanized Surfaces:
 - a. Clean welds and grind serious abrasions.
 - 3. Preparation Of Galvanized Surfaces:
 - a. Follow requirements of ASTM A780/A780M and following:
 - b. For Repair Using Zinc-Rich Paints:
 - 1) Blast clean surfaces to near-white metal, in accordance with SSPC-SP10 (1 to 2 mil anchor pattern), as minimum.
 - 2) Where circumstances do not allow blast cleaning, power disk sand to bright metal finish.
 - 3) Extend surface preparation into undamaged galvanized area.
 - 4) Remove flux residue and weld spatter from welded areas.

- c. For Repair Using Zinc-Based Alloys:
 - 1) Clean surface to be reconditioned using wire brush, light grinding action, or mild blasting.
 - 2) Extend surface preparation into surrounding, undamaged galvanized areas.
 - 3) Remove flux residue and weld spatter from welded areas.
 - 4) Preheat cleaned area to at least 600 deg F.
 - a) Do not overheat surface beyond 750 deg F or allow surrounding galvanized coatings to be burned.
 - b) Wire brush surface during preheating.
- d. For Repair Using Sprayed Zinc (Metallizing):
 - 1) Blast clean surfaces to near-white metal, in accordance with SSPC-SP5 as minimum.
 - 2) Extend surface preparation into undamaged galvanized area.
 - 3) Remove flux residue and weld spatter from welded areas.

3.2 REPAIR / RESTORATION

- A. Repairs To Primed, Ungalvanized Surfaces:
 - 1. Thoroughly clean metal and give one (1) prime coat of specified material, well-worked into metal joints and open spaces. Match existing primed finish as required.
 - a. Do not apply primer at temperatures below 45 deg F.
 - b. Protect un-primed machine-finished surfaces against corrosion by priming.
- B. Repairs To Galvanized Surfaces:
 - 1. Non-Structural, Non-Load-Bearing Items Not Exposed To Weather:
 - a. Repair Using Zinc-Rich Paints: Spray- or brush-apply zinc-rich paint to prepared area. Apply paint in single application employing multiple spray passes to achieve dry film thickness of 2 mils.
 - 2. Structural, Load-Bearing Items And Items Exposed To Weather:
 - a. Repair Using Zinc-Based Alloys:
 - 1) Rub cleaned, pre-heated areas with repair stick to deposit evenly distributed layer of zinc alloy. If powdered zinc alloys are used, sprinkle powder on surface and spread out with spatula or similar tool.
 - 2) Remove flux residue by rinsing with water or wiping with damp cloth.
 - b. Repair Using Sprayed Zinc (Metallizing): Apply 2 mil minimum coating by means of metal-spraying pistols fed with either zinc wire or zinc powder in accordance with requirements of ASTM B695, Type I.
 - 3. All Items:
 - a. Apply repair materials immediately after surface preparation is complete.
 - b. Take thickness measurements, with either magnetic or electromagnetic gauge, to ensure applied coating is as specified or agreed to.

END OF SECTION

**SECTION 05 0523
METAL FASTENING**

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 QUALITY ASSURANCE

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

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

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

2.2 ACCESSORIES

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

PART 3 - EXECUTION**3.1 PERFORMANCE**

- A. Welding shall meet requirements of ANSI / AWS D1.1 and D1.3.

END OF SECTION

**SECTION 05 1200
STRUCTURAL STEEL FRAMING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install structural steel framing as part of building structure as described in Contract Documents.
- B. Products Furnished But Not Installed Under This Section:
 - 1. Structural anchors, plates, channels, angles, etc, to be cast into concrete.
- C. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting.
 - 2. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - 3. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 4. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation of structural items to be cast into concrete.
 - 5. Sections under 04 2000 heading: Installation of structural items to be embedded in masonry.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in pre-installation conference.
 - 2. In addition to agenda items specified in Section 01 3100, review following:
 - a. 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 requirements and frequency of testing and inspections.
- B. Scheduling:
 - 1. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing structural steel framing.
 - 2. Notify Testing Laboratory at least three (3) weeks in advance of fabrication.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Submit product data and samples, if requested by Architect.
 - 2. Shop Drawings:
 - a. Shop drawings and calculations, prepared and stamped by structural engineer, shall include, but not be limited to, plans, elevations, and large scale details of typical sections, connections, joining, and accessories.
 - b. Show other fabricated work.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Certificate of conformance by Manufacturer certifying that steel is new steel conforming to referenced ASTM requirements and standards.
 - b. Fabricator certificates.
 - c. Mill certificates certifying chemical and physical properties of all steel furnished on Project.
 - d. Welding certificates.
- C. 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 Inspection Reports of structural steel framing.

1.4 QUALITY ASSURANCE

- A. Qualifications. Requirements of Section 01 4301 applies, but is not limited to following:
 - 1. Inspector Qualifications:
 - a. All inspectors shall be trained and competent in accordance with quality assurance plan in Section 01 4523.
 - b. Bolting Inspector Qualifications:
 - 1) Each bolting Inspector shall be trained and qualified to inspect bolting operations and high strength bolted connection for compliance with RCSC Specification and Quality Assurance Plan.

- 2) Competency shall be demonstrated through administration of written examination and through hands-on demonstration by Inspector of methods to be used for bolt installation and inspection.
- c. Non-destructive testing Personnel Qualifications:
 - 1) NDT personnel shall be qualified under either ANSI / ASNT CP-189 or ANSI / ASNT SNT-TC-1A.
 - 2) Ultrasonic Testing (UT) shall be performed only by certified ASNT Level III technicians or by certified ASNT Level II technicians acting under direct supervision of ASNT Level III technician.
 - 3) Technicians who perform flaw detection or sizing shall be trained in applicable procedures and authorized to operate in jurisdiction in which Project is located and shall demonstrate their competence through testing as prescribed in FEMA 353 Appendix E for all connections that are part of SFRS.
- d. Welding Inspector Qualifications:
 - 1) All Welding Inspectors shall meet qualification as set forth in ANSI/AWS D1.1/D1.1M.
 - 2) For welds in SWD Categories A and B, Welding Inspectors shall be AWS Certified Welding Inspectors (CWI) or Senior Certified Welding Inspectors (SCWI) as defined in AWS QC1, Standard and Guide for Qualification and Certification of Welding Inspectors.
 - 3) Bolting Inspectors shall be ICC Structural Steel Inspectors.
2. Fabricator Qualifications:
 - a. Not less than five (5) years experience with similar in size, scope, and installation procedures required for this project.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 1. Deliver material to job site at such intervals as to insure uninterrupted progress of Work.
 2. Deliver anchor bolts, bearing plates and other items to be set by other Contractors shall be delivered to site in ample time for installation and with templates and/or setting instructions.
- B. Storage And Handling Requirements:
 1. Structural steel shall not be handled until paint has thoroughly dried. Care must be exercised to avoid abrasions and other damage.
 2. Material shall be stocked out of mud and dirt and proper drainage shall be provided. Structural steel must be protected from damage or soiling by adjacent construction operations.

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. Materials:
 1. Angles, Channels, and Miscellaneous steel parts of steel framing systems.
 - a. Meet requirements of ASTM A36/A36M.
 - b. S, HP, C, or TEE shapes in horizontal or vertical application, together with angles, plates, etc, as shown on Drawings.
 2. Columns, Beams 'W' shapes: Meet requirements of ASTM A992/A992M without supplementary requirements.
 3. Structural Pipe:
 - a. Meet requirements of ASTM A53/A53M, Type E or S, Grade B.
 - 1) Weight Class, STD, Schedule 40.
 - 2) Weight Class, XS, Schedule 80.
 4. Structural Tubing: Meet requirements of ASTM A500/A500M, Grade B.
- B. Fabrication:
 1. Requirements: Structural metal shall be product of domestic mill.
 2. ANSI/AISC 360 shall serve as minimum standard.
 3. Fabricate items to be embedded in concrete or masonry according to approved details of work to be connected.
- C. Finishes: Shop prime structural steel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
 1. Do not begin structural steel framing erection until structural support components have been installed and are in suitable condition to receive framing.

3.2 ERECTION**A. Special Techniques:**

1. Standards:
 - a. AISC's 'Specification for Structural Steel Buildings' and 'Code of Standard Practice for Steel Buildings and Bridges' shall serve as minimum standards. Erection includes setting, aligning, and bracing as necessary.
2. Do not overload or exceed carrying capacity of any structural steel element during construction period.
3. Bridging installation shall proceed concurrently with truss erection and be completed before trusses are subjected to construction loads.
 - a. Do not remove bridging after construction is complete.
4. Plates or Channels Embedded in Concrete:
 - a. Tack weld bolts to plates or channels to prevent bolts from turning when nuts are tightened.
5. Immediately after erection, clean completed field connections and damaged surfaces with solvents and hand or power tools. After cleaning, apply corrosion-resistant primer compatible with factory-applied primer.

B. Interface With Other Work:

1. Furnish items to be embedded in concrete or masonry to Division 03 or 04 respectively in time to be securely tied in place before placing concrete and grout.

3.3 FIELD QUALITY CONTROL**A. Field Tests And Inspections:**

1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor.
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
 - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
2. General Requirements:
 - a. Furnish items to be embedded in concrete or masonry to Division 03 or 04 respectively in time to be securely tied in place before placing concrete and grout.
3. Structural Steel - General:
 - a. Testing Agency shall provide testing and inspection of structural steel including following:
 - 1) Mill Certificates:
 - a) Mill certificates or affidavits and manufacturer's certification shall be supplied to inspector for verification of steel materials.
 - b) Testing laboratory shall be notified at least three (3) weeks in advance of fabrication and supplied with reports so that shop inspection may be performed.
 - 2) General Inspection:
 - a) Testing Agency shall be at fabricator's plant to verify that materials used match mill tests or affidavits of test reports; that fabrication, welding procedures, surface preparation, and shop painting meet specifications; and that work in progress conforms to project requirements.
 - b) Testing Agency shall visually check fabricated steel delivered to job to confirm that work is in compliance with approved shop drawings and shall make any physical tests, measurements, etc., believed to be necessary.
 - c) Testing Agency shall witness and report all corrections performed by steel fabricator occurring on fabricators own initiative.
 - 3) Bolting Requirements: All inspection shall conform to requirements of current edition of AISC 340, 'Specification for Structural Joints using High-Strength Bolts' using F3125/F3125M Grade A325 and Grade A490 Bolts:
 - a) Miscellaneous Metal: Where miscellaneous angles, channels, studs, and similar shapes are detailed for support of major components of work, welds, bolts, and material are subject to same testing requirement as other structural supporting members.
 - b) Inspections shall include required verification and inspection of steel construction as referenced in IBC Section 17 'Special Inspections And Tests' and in accordance with ANSI/AISC 360 and applicable ASTM material standards, and ANSI/AISC 360, Section M2.5. Periodic and continuous inspections include:
 - (1) Material verification of high-strength bolts, nuts and washers:

- (a) Identification markings to conform to AWS designation listed in WPS (periodic).
 - (b) Manufacturer's certificated of compliance required (periodic).
 - (2) Inspection of high-strength bolting:
 - (a) Snug-tight joints.
 - (b) Pretensioned and slip-criteria joints using turn-of-nut with match marking, twist-off bolt or direct tension indicator methods of installation (periodic).
 - (c) Pretension and slip-critical joints using turn-of-nut without match marking or calibrated wrench methods of installation (continuous).
 - 4) Welding Requirements: Inspection shall be provided by Testing Agency for all welding in accordance with Building Code:
 - a) Nondestructive testing shall be performed as required by Building Code and ANSI/AWS D1.1/D1.1M as specified herein for all shop and field welds.
 - b) Ultrasonically test 100 percent of all complete penetration welds and 100 percent of all partial-penetration column splice welds.
 - c) Ultrasonically test all joints where base metal is thicker than 1-1/2 inches, when subjected to through-thickness weld shrinkage strains. Joint shall be ultrasonically inspected for discontinuities directly behind such welds after joint completion.
 - d) When ultrasonic indications arising from weld root cannot be interpreted as either weld defect or backing strip itself, backing strip shall be removed at expense of Contractor, and if no root defect is visible, weld shall be re-tested. If no defect is indicated on this re-test, and no significant amount of weld metal has been removed, no further repair of welding is necessary. If defect is indicated, it shall be repaired at no expense to Owner.
 - e) Perform Magnetic Particle (MP) tests of fillet welds larger than 5/16 inch
- Exceptions:
- (1) When approved by Owner's Representative and/or Architect/Engineer, rate of testing for ultrasonic testing of complete-penetration welds may be reduced in accordance with following:
 - (a) Nondestructive testing rate for individual welder or welding operator may be reduced to 25 percent, provided reject rate is demonstrated to be 5 percent or less of welds tested for welder or welding operator. Sampling of at least 40 completed welds for job shall be made for such reduction evaluation. Reject rate is defined as number of welds containing rejectable defects divided by number of welds completed).
 - (b) For complete penetration groove welds on materials less than 5/16 inch thick, nondestructive testing is not required provided continuous inspection is provided.
 - (c) When approved by building official, nondestructive ultrasonic testing may be performed in shop of AISC approved fabricator utilizing qualified test techniques in employment of fabricator.
 - (2) Other ultrasonic or magnetic particle testing may be reduced by approval of Owner's Representative and/or Architect/Engineer upon presentation of satisfactory documentation submitted by Contractor.
 - (3) There shall be no exceptions to testing requirements for SFRS.
- f) Inspections shall include required verification and inspection of steel construction as referenced in IBC Section 17 'Special Inspections And Tests' and in accordance with ANSI/AISC 360, Section A3.5 and applicable ANSI/AWS A5 documents, ANSI/AWS D1.1/D1.1M, ANSI/AWS D1.3/D1.3M, ANSI/AWS D1.4/D1.4M, and ACI 318 or ACI 318M, Section 3.5.2. Periodic and continuous inspections include:
 - (1) Material verification of weld filler materials:
 - (a) Identification markings to conform to AWS designation listed in WPS (periodic).
 - (b) Manufacturer's certificated of compliance required (periodic).
 - (2) Inspection of welding:
 - (a) Structural steel and cold-formed steel deck:

- (i) Complete and partial joint penetration groove welds (continuous).
 - (ii) Multipass fillet welds (continuous).
 - (iii) Single-pass fillet welds $> 5/16$ inch (continuous).
 - (iv) Plug and slot welds (continuous).
 - (v) Single-pass fillet welds $\leq 5/16$ inch (periodic).
- 5) Steel Frame Requirements:
 - a) Inspections shall include required verification and inspection of steel frame as referenced in IBC Section 17 'Special Inspections And Tests' and in accordance with ANSI/AISC 360 and Applicable ASTM material standards. Periodic inspections include:
 - (1) Inspection of steel frame joint details compliance with approved construction documents:
 - (a) Details such as bracing and stiffening (periodic).
 - (b) Member locations (periodic).
 - (c) Applications of joint details at each connection (periodic).

END OF SECTION

SECTION 05 1223
STRUCTURAL STEEL FOR BUILDINGS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Miscellaneous structural steel including following:
 - a. Channel frames for doors.
 - b. Lintels.
- B. Related Requirements:
 - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation of bollards and satellite dish base.
 - 2. Sections under 04 2000 heading: Installation of lintels, channel frames, and miscellaneous structural steel.
 - 3. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of priming.
 - 4. Section 05 0523: 'Metal Fastening' for quality of welding.
 - 5. Section 06 1100: 'Wood Framing' for installation of miscellaneous structural steel.
 - 6. Section 09 9113: 'Exterior Painted Galvanized Metal' for preparing and painting new exterior exposed galvanized metal surfaces.

PART 2 - PRODUCTS**2.1 COMPONENTS**

- A. Materials:
 - 1. Structural Tubing: Meet requirements of ASTM A500/A500M, Grade B.
 - 2. Miscellaneous Steel:
 - a. Meet requirements of ASTM A36/A36M for the following:
 - 1) Miscellaneous structural steel.
 - 2) Channel frames.
 - 3) Lintels for exterior walls.
 - 4) Miscellaneous structural steel.
- B. Fabrication:
 - 1. After fabrication and before shop priming, hot-dip or mechanically galvanize to be installed in following:
 - a. Channel frames.
 - b. Lintels in exterior walls.
 - 2. Shop prime steel provided under this Section.
- C. Finishes:
 - 1. Galvanized:
 - a. Galvanize finish for following:
 - 1) Channel frames.
 - 2) Lintels in exterior walls.
 - b. See Section 09 9113 for preparing and painting new exterior exposed galvanized metal surfaces.

PART 3 - EXECUTION: Not Used

END OF SECTION

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DIVISION 06: WOOD, PLASTICS, AND COMPOSITES

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

06 0573 PRESERVATIVE WOOD TREATMENT

06 1000 ROUGH CARPENTRY

06 1011 WOOD FASTENINGS

06 1100 WOOD FRAMING

06 1636 WOOD PANEL PRODUCT SHEATHING

06 2000 FINISH CARPENTRY

06 2001 COMMON FINISH CARPENTRY REQUIREMENTS

06 2024 DOOR, FRAME, AND FINISH HARDWARE INSTALLATION

06 2210 MISCELLANEOUS WOOD TRIM

06 4000 ARCHITECTURAL WOODWORK

06 4001 COMMON ARCHITECTURAL WOODWORK REQUIREMENTS

06 4005 PLASTIC LAMINATE

06 4116 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

06 4512 ARCHITECTURAL WOODWORK WOOD TRIM

06 6000 PLASTIC FABRICATIONS

06 6001 MISCELLANEOUS PLASTIC FABRICATIONS

06 6413 PLASTIC PANELING

END OF TABLE OF CONTENTS

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**SECTION 06 0573
PRESERVATIVE WOOD TREATMENT**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Quality of wood preservative treatment where specified.
- B. Related Requirements:
 - 1. Section 06 1100:
 - a. Characteristics of wood to be pressure-treated.
 - b. Furnishing and installing of pressure-treated wood.
 - 2. Section 06 0573.93: 'Insect Protection Wood Treatment' for more aggressive wood treatment protection if needed to protect wood.:

1.2 SUBMITTALS

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

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Manufacturers:
 - 1. Type One Acceptable Manufacturers:
 - a. Arch Wood Protection Inc, Atlanta, GA www.wolmanizedwood.com.
 - b. Hoover Treated Wood Products, Thomson, GA www.frtw.com.
 - c. Osmose Inc, Griffin, GA www.osmose.com.
 - d. U S Borax Inc, Valencia, CA www.borax.com/wood.
 - e. Viance LLC, Charlotte, NC www.treatedwood.com.
 - f. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Performance:
 - 1. Framing lumber grade and species shall be as specified in Section 06 1100 for particular use.
 - 2. Interior Wood In Contact With Concrete or Masonry:
 - a. Preservatives:
 - 1) Disodium octoborate tetrahydrate (DOT / SBX) meeting requirements of AWPA U1 and with retention of 0.25 lbs per cu ft (.
 - 2) Zinc borate meeting requirements of AWPA U1 and with retention of 0.17 lbs per cu ft (.
 - 3) CCA-C (47.5 percent chromium trioxide, 18.5 percent copper oxide and 34 percent arsenic pentoxide) by Koppers Performance Chemicals, Griffin, Georgia, <http://www.koppersperformancechemicals.com/> (0.25 lb/cu ft minimum retention).
 - 4) DURA-GUARD by Hoover Treated Wood Products, Thomson, GA www.frtw.com (.40 lb/cu ft minimum retention).
 - b. Lumber: Treat in accordance with AWPA U1.
 - 3. Exterior Wood Continuously Exposed To Weather:
 - a. Preservatives: Waterborne preservatives meeting requirements of AWPA U1 with retention levels as required by AWPA U1 for specific application.
 - b. Lumber: Treat in accordance with AWPA U1.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 06 1011 WOOD FASTENINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Quality of wood fastening methods and materials used for Rough Carpentry unless specified otherwise.
- B. Related Requirements:
 - 1. Section 03 1511: 'Concrete Anchors and Inserts' for Quality of Anchors and Inserts.
 - 2. Section 05 0523: 'Metal Fastenings' for Quality of bolts used for Rough Carpentry.
 - 3. Furnishing and installing of other fasteners are specified in individual Sections where installed.

1.2 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
8d Box	2-1/2 inches	0.113 inch
8d Common	2-1/2 inches	0.131 inch
10d Box	3 inches	0.128 inch
10d Common	3 inches	0.148 inch
16d Box	3-1/2 inches	0.135 inch
16d Sinker	3-1/4 inches	0.148 inch
16d Common	3-1/2 inches	0.162 inch

- B. Materials:
 - 1. Wood fastener list:
 - a. Provide VMR Suppliers with wood fastener list.
 - 2. 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.
 - 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.
 - b) Redhead Division of ITW, Wood Dale, IL www.itw-redhead.com and Markham, ON www.itwconstruction.ca.
 - c) Equals as approved by Architect through shop drawing submittal before installation. See Section 01 6200.
- 3. 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.

PART 3 - EXECUTION**3.1 ERECTION**

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

END OF SECTION

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

- A. Includes But Not Limited To:
 - 1. Furnish and install wood framing and blocking as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
 - 1. Miscellaneous structural steel elements.
- C. Related Requirements:
 - 1. Section 05 1223: 'Structural Steel For Buildings' for furnishing of miscellaneous structural steel.
 - 2. Sections under 06 0500 Heading: Wood Treatment.
 - 3. Sections under 06 4000 Heading: 'Architectural Woodwork' for wall blocking requirements.

1.2 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Protect lumber and plywood 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 plywood on level racks and keep free of ground to avoid warping.
 - 2. Stack to insure proper ventilation and drainage.

PART 2 - PRODUCTS**2.1 MATERIAL**

- A. Dimension Lumber:
 - 1. Meet requirements of PS 20 and National Grading Rules for softwood dimension lumber.
 - 2. Bear grade stamp of WWSA, SPIB, or other association recognized by American Lumber Standards Committee identifying species of lumber by grade mark or by Certificate of Inspection.
 - 3. Lumber 2 inches 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'.
 - 4. Preservative Treated Plates / Sills:
 - a. 2x4: Standard and better Douglas Fir, Southern Pine, or HemFir, or StrandGuard by iLevel by Weyerhaeuser Boise, ID www.ilevel.com. (LSL 1.3 E)
 - b. 2x6 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. (LSL 1.3 E).
- B. Lumber Ledgers:
 - 1. No. 1 Douglas Fir, Larch, or Southern Pine.
- C. Blocking:
 - 1. Sound lumber without splits, warps, wane, loose knots, or knots larger than 1/2 inch.
- D. Furring Strips:
 - 1. Utility or better.

PART 3 - EXECUTION**3.1 ERECTION**

- A. General:
 - 1. Use preservative treated wood for wood members in contact with concrete or masonry.
- B. Masonry Wall Plates:
 - 1. Anchor 2x6 and 2x8 wall plates to top of block walls with 5/8 inch diameter anchor bolts at 32 inches on center unless noted otherwise.
 - 2. Set plates on masonry bearing walls true and level to provide full bearing. Use mortar as specified in Division 04 for leveling if leveling is required.
- C. Accessory / Equipment Mounting And Standing & Running Trim Blocking (nailers):
 - 1. Furnish and install blocking in wood framing required for hardware, specialties, equipment, accessories, and mechanical and electrical items, etc.
 - 2. Attach blocking not installed with clips with two fasteners in each end of each piece of blocking.
- D. Furring Strips
 - 1. On Wood or Steel: Nail or screw as required to secure firmly.
 - 2. On Concrete or Masonry:
 - a. Back up furring strips on exterior walls or walls in contact with earth with 15 lb felt strip.
 - b. Nail at 12 inches on center maximum.

END OF SECTION

SECTION 06 1636
WOOD PANEL PRODUCT SHEATHING

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install exposed wood panel product sheathing required for floors at Mechanical Mezzanine as described in Contract Documents. Exposed wood panel product also includes:
 - a. Catwalks.
 - b. Telephone boards.

1.2 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Sheathing:
 - 1. A/C grade plywood meeting requirements of PS 1, PS 2, or PRP-133 (TECO).
 - 2. Every sheet of sheathing shall be stamped as follows:
 - a. Appropriate APA, TECO, or PFS grade stamp identifying thickness and span rating.
 - b. Exposure 1 or Exterior.
 - 3. Sheathing shall not exceed 18 percent moisture content when fabricated nor more than 19 percent when installed in Project.
 - 4. Sheathing used for same purpose shall be of same thickness. In all cases, thickness specified is minimum required regardless of span rating.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install plywood with 'A' side exposed.
- B. Edge Bearing And Blocking: Panel edges shall bear on framing members and butt along their centerlines.
- C. Fastening:
 - 1. Place fasteners not less than 3/8 inch in from edge, 12 inches on center along intermediate supports, and 6 inches on center along panel edge.
 - 2. Tops of fasteners shall be flush with sheathing surface.

END OF SECTION

SECTION 06 2001
COMMON FINISH CARPENTRY REQUIREMENTS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install sealants required for items installed under this Section, as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
 - 1. Architectural Woodwork.
 - 2. Chair Rails.
 - 3. Door-mounted Coat Racks and hangers.
 - 4. Factory Manufactured Access Doors.
 - 5. Selected Building Specialties.
 - 6. Selected Equipment.
 - 7. TV Wall Mounted Support Bracket (Owner Furnished).
 - 8. Window Stools.
 - 9. Miscellaneous as specified elsewhere.
- C. Related Requirements:
 - 1. Section 06 1100: 'Wood Framing' for furring and blocking.
 - 2. Section 06 2210: 'Miscellaneous Wood Trim'.
 - 3. Sections under 06 4000 Heading: Furnishing of Architectural Woodwork.
 - a. Section 06 4001: 'Common Architectural Woodwork Requirements':
 - 1) Approved Fabricators.
 - 2) Quality of wood materials to be used in Finish Carpentry.
 - b. Section 06 4005: 'Plastic Laminate' for countertops.
 - c. Section 06 4116: 'Plastic Laminated-Faced Architectural Cabinets'.
 - d. Section 06 4512: 'Architectural Woodwork Wood Trim'.
 - 4. Section 06 6001: 'Miscellaneous Plastic Fabrications' for quality of Window Stools.
 - 5. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants, submittal and installation requirements.
 - 6. Sections under 09 9000 heading: Back priming of work to be installed against concrete or masonry or subjected to moisture, and finishing of finish carpentry and architectural woodwork.
 - 7. Sections in Division 10: Furnishing of Specialties.
 - 8. Sections in Division 11: Furnishing of Equipment.

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.
 - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.
- B. Definitions:
 - 1. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade:
 - a. Economy Grade: The lowest acceptable grade in both material and workmanship requirements, and is for work where price outweighs quality considerations.
 - b. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
 - c. Premium Grade: The highest Grade available in both material and workmanship where the highest level of quality, materials, workmanship, and installation is required.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Bommer Industries, Landrum, SC www.bommer.com.
 - b. ClosetMaid, a division of Emerson Electric, Ocala, Florida www.closetmaid.com.
 - c. Stanley, New Britain, CT www.stanleyhardware.com or Oakville, ON (800) 441-1759.
- B. Glue: Waterproof and of best quality.

PART 3 - EXECUTION**3.1 EXAMINATION**

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

3.2 PREPARATION

- A. Surface Preparation:
 - 1. Install Architectural Woodwork after wall and ceiling painting is completed in areas where Architectural Woodwork is to be installed.

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.
- C. Items Installed But Not Furnished Under This Section: Install in accordance with requirements specified in Section furnishing item.
 - 1. TV Wall Mounted Support Bracket (Owner Furnished).
 - a. Mounting Height:
 - 1) As shown on Contract Documents.
 - 2. Window Stool:
 - a. Install window stool to structure with silicone sealant as specified in Section 07 9213 'Elastomeric Joint Sealant'.

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

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference.
 - 1. Participate in pre-installation conference.

1.3 SUBMITTALS

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

1.4 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS: Not Used**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Hollow Metal Frames:
 - 1. Site Tolerances:
 - a. Squareness: 1/16 inch from top edge to opposite top edge.
 - b. Plumbness: 1/16 inch from top of jamb to bottom of jamb.
 - c. Alignment: 1/16 inch from plane of left side face of jamb to right side face of jamb.
 - d. Twist: 1/16 inch 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 at head and hinge jamb plus 1/16 inch maximum
 - 2) 1/8 inch at strike jamb plus or minus 1/16 inch maximum.

- 3) 1/2 inch to top of finished floor surface or 1/4 inch to top of threshold, plus or minus 1/16 inch maximum.
2. Set frame in location and level head.
 - a. Use of crowbar or other prying device to set door frame into wall opening will damage door frames and are not permitted to be used.
3. Equalize with adjustable floor anchor.
4. Set spreaders and fasten jambs to floor and wall.
 - a. Wood spreaders shall be square, fabricated from lumber one inch minimum thick, be same length as door opening at header, and same depth as frame.
 - b. Cut notches for frame stops.
 - c. Do not remove spreaders until frames are permanently anchored in wall.
 - d. Use one spreader at base of frame and another at strike level.
 - e. Do not use temporary spreaders welded to base of jambs during installation of frame.
5. Fill gap between frame and framing with R-19 by 2-foot wide fiberglass insulation batt tightly packed in jamb and head..
6. Caulking:
 - a. Caulk around both sides of frames of doors receiving acoustical seals with specified sealant.
 - b. Caulk around both sides of frames installed in exposed masonry walls with specified sealant.
- B. Doors:
 1. When Project is completed, doors shall not bind, stick, or be mounted so as to cause future hardware difficulties.
 2. Do not impair utility or structural strength of door in fitting of door, applying hardware, or cutting and altering door louvers, panels, or other special details.
- C. Hardware:
 1. General:
 - a. Install using set of Manufacturer's installation, adjustment, and maintenance instructions submitted with hardware under Section 08 7101. Follow as closely as possible.
 - b. Mount closers on jamb stop side of door in parallel arm configuration where it is physically possible to do so and not damage or hinder operation of door or closer.
 2. Hardware for Wood Doors:
 - a. If doors are not factory-machined, use hardware templates furnished by Hardware Manufacturer when mounting hardware.
 - b. Set hinges flush with edge surface. Be sure that hinges are set in a straight line to prevent distortion.
 - c. Mount door latches high in strike plate opening so when door later settles, latch will not bind.

3.2 FIELD QUALITY CONTROL

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

3.3 CLOSEOUT ACTIVITIES

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

END OF SECTION

**SECTION 06 2210
MISCELLANEOUS WOOD TRIM**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install wood trim not specified elsewhere as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 06 1100: 'Wood Framing' for wall blocking required for Wood Trim.
 - 2. Section 06 2001: 'Common Finish Carpentry Requirements':
 - a. Installation of Wood Trim.
 - 3. Section 06 4001: 'Common Architectural Woodwork Requirements':
 - a. Approved Fabricators.
 - b. General standards for materials and fabrication of Architectural Woodwork.
 - 4. Section 06 4512: 'Architectural Woodwork Wood Trim'.
 - 5. Section 09 9324: 'Interior Clear-Finished Hardwood'.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Samples:
 - a. Interior Hardwood for Transparent Finish:
 - 1) Before performing work of this Section, prepare Control Sample, to match sample available from Owner, to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
 - 2) Design Criteria:
 - a) Provide 8 inch by 10 inch 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 for finish.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Design Criteria:
 - 1. General:
 - a. Meet requirements of Section 06 4001 for general standards for materials and fabrication of Architectural Woodwork.
 - 2. Clear Finished Hardwood:
 - a. Match materials specified in Section 06 4512.
 - b. Match finish specified in Section 06 4512 and match Owner selected sample as specified in Section 09 9324.

2.2 SOURCE QUALITY CONTROL

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

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 06 4001
COMMON ARCHITECTURAL WOODWORK REQUIREMENTS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. General standards for materials and fabrication of Architectural Woodwork and for hardware associated with Architectural Woodwork.
- B. Related Requirements:
 - 1. Section 06 1100: 'Wood Framing' for furring and blocking.
 - 2. Section 06 2001: 'Common Finish Carpentry Requirements' for Installation.
 - 3. Section 06 2210: 'Miscellaneous Wood Trim'.
 - 4. Section 06 4005: 'Plastic Laminate'.
 - 5. Section 06 4114: 'Wood-Veneer-Faced Architectural Cabinets'.
 - 6. Section 06 4512: 'Architectural Woodwork Wood Trim'.
 - 7. Section 06 6001: 'Miscellaneous Plastic Fabrications'.
 - 8. Section 09 9324: 'Interior Clear-Finished Hardwood' for filling of nail holes and finishing.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
 - 1. Fabricator:
 - a. Fabricator Firm specializing in performing work of this section.
 - 1) Firm experience in supplying products indicated for this Project.
 - 2) Firm with sufficient production capacity to produce required units.
 - 3) Firm will comply with specifications and Contract Documents for this Project.
 - 4) Minimum five (5) years experience in Woodwork installations.
 - 5) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and installation procedures required for this project before bidding.
 - b. Upon request by Architect or Owner, submit documentation.

1.4 DELIVERY, HANDLING, AND STORAGE

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

PART 2 - PRODUCTS**2.1 FABRICATORS**

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

2.2 ASSEMBLIES

- A. Design Criteria:
 - 1. General:
 - a. AWS Custom Grade is minimum acceptable standard, except where explicitly specified otherwise, for materials, construction, and installation of architectural woodwork.
 - 2. Materials:

- a. Lumber:
 - 1) Grade:
 - a) No defects in boards smaller than 600 sq in.
 - b) One defect per additional 150 sq inches in larger boards.
 - c) Select pieces for uniformity of grain and color on exposed faces and edges.
 - d) No mineral grains accepted.
 - 2) Allowable Defects:
 - a) Tight knots not exceeding 1/8 inch in diameter. No loose knots permitted.
 - b) Patches (dutchmen) not apparent after finishing when viewed beyond 18 inches.
 - c) Checks or splits not exceeding 1/32 inch by 3 inches and not visible after finishing when viewed beyond 18 inches.
 - d) Stains, pitch pockets, streaks, worm holes, and other defects not mentioned are not permitted.
 - e) Normal grain variations, such as cats eye, bird's eye, burl, curl, and cross grain are not considered defects.
 - 3) Use maximum lengths possible, but not required to exceed 10 feet without joints. No joints shall occur closer than 72 inches in straight runs exceeding 18 feet. Runs between 18 feet and 10 feet may have no more than one joint. No joints shall occur within 72 inches of outside corners nor within 18 inches of inside corners.
 - 4) Moisture content shall be six (6) percent maximum at fabrication. No opening of joints due to shrinkage is acceptable.
- B. Fabrication:
 - 1. Follow Architectural Woodwork Standards (AWS) for fabrication of Architectural Woodwork.
 - 2. Tolerances:
 - a. No planer marks (KCPI) allowed. Sand wood members and surfaces with 100 grit or finer.
 - b. Maximum Gap: None allowed.
 - c. Flushness Variation: 0.015 inch maximum.
 - d. Sanding Cross Scratches: 1/4 inch maximum.
 - e. Plug screw holes. Screw locations not to be visible beyond 18 inches.
 - 3. Fabricate work in accordance with measurements taken on job site.
 - 4. 'Ease' sharp corners and edges of exposed members to promote finishing and protect users from splinters. Radius of 'easing' shall be uniform throughout Project and between 1/32 and 1/16 of an inch.
 - 5. Fabricate so veneer grain is vertical.
 - 6. Joints:
 - a. Use lumber pieces with similar grain pattern when joining end to end.
 - b. Compatibility of grain and color from lumber to panel products is required.
 - 7. Install hardware in accordance with Manufacturer's directions. Leave operating hardware operating smoothly and quietly.
 - 8. Remove or repair damaged surface of or defects in exposed finished surfaces of architectural woodwork to match adjacent similar undamaged surface.

PART 3 - EXECUTION: Not Used

END OF SECTION

**SECTION 06 4005
PLASTIC LAMINATE**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Wall-hung counters.
 - 2. Countertops for custom casework.
- B. Related Requirements:
 - 1. Section 06 2001: 'Common Finish Carpentry Requirements':
 - a. Installation of wall-hung counters.
 - b. Installation of countertops for custom casework.
 - 2. Section 06 4001: 'Common Architectural Woodwork Requirements':
 - a. Approved Fabricators.
 - b. General standards for materials and fabrication of Architectural Woodwork.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Color selections.
 - b. Manufacturer's technical data sheet.

1.3 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 or Formica Canada Inc, St Jean sur Richelieu, PQ (450) 347-7541, all matte finish.
 - b. 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. Category Four Approved Colors. See Section 01 6200 for definition of Categories:
 - a. No. 507-58, Folkstone Grafix by Formica, all matte finish.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 06 4116
PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Custom casework:
- B. Related Requirements:
 - 1. Section 06 1100: 'Furring and blocking.
 - 2. Section 06 2001: 'Common Finish Carpentry Requirements':
 - a. Installation of wall-hung counters.
 - b. Installation of countertops for custom casework.
 - 3. Section 06 4001: 'Common Architectural Woodwork Requirements':
 - a. Approved Fabricators.
 - b. General standards for materials and fabrication of Architectural Woodwork.
 - 4. Section 06 4006: 'Plastic Laminate' for countertops.
 - 5. Sections Under 22 4200 Heading: Plumbing Fixtures.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the efforts of the various trades affected by the Work of this Section.
 - 2. Coordinate completion of 2x6 wall blocking for custom casework.
 - 3. Coordinate completion of custom casework.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature or cut sheets for hardware.
 - 2. Shop Drawings:
 - a. Confirm compliance with Contract Document requirements as to configuration and dimensions of custom casework.
 - b. Include plan and elevation views, materials used, standing and running trim profiles, assembly methods, joint details, fastening methods, accessories, and hardware.

1.4 DELIVERY, HANDLING, AND STORAGE

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

1.5 WARRANTY

- A. Manufacturer Warranty:
 - 1. Fabricator's written guarantee that all Goods and Services will be free from defects in materials and workmanship for warranted period from date of substantial completion.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Accuride, Santa Fe Springs, CA www accuride.com.
 - b. Blum Inc, Stanley, NC www blum.com.
 - c. Charter Industries, Kentwood, MI www charterindustries.com.
 - d. CompX National, Mauldin, SC www nclnet.com.
 - e. Formica, Cincinnati, OH www formica.com.
 - f. Grass America Inc, Kernerville, NC www grassusa.com.
 - g. Hafele America Co., Archdale, NC hafele.com.
 - h. Ives, Indianapolis, IN www iveshardware.com.
 - i. Knappe & Vogt, Grand Rapids, MI www knapeandvogt.com.
 - j. Nevamar, Odenton, MD www nevamar.com.
 - k. Olympus Lock Co, Seattle, WA www olympus-lock.com.
 - l. Salice America Inc, Charlotte, NC (800) 222-9652 or (704) 841-7810 www saliceamerica.com.
 - m. Stanley, New Britain, CT www stanleyhardware.com.

B. Components:

1. Design Criteria:

a. General:

- 1) Except as noted otherwise, fabricate the work of this section to AWS 'Custom Grade'.

2. Panel Product:

- a. Glues (adhesives) used in manufacture and fabrication of panel products shall be Type I or II.

- b. Moisture content shall be same as specified for lumber.

c. Cores:

- 1) Cabinet Doors: Medium density fiberboard (MDF) with minimum density of 48 lbs per cu ft.
- 2) All Other: Industrial grade particle board with minimum density of 45 lbs per cu ft.

d. Facings And Colors:

- 1) Plastic Laminate: Formica, 927-58 Folkstone.
- 2) Melamine or Kortron: White.

e. Edgings:

1) Shelves And Exposed Panel Product Edges:

- a) Hot-glued, 2 mm thick minimum, PVC edge-banding.
- b) Wood-grained or solid color to match cabinet, except color matching Melamine or Kortron surface at shelf edges.

2) Semi-Exposed Panel Product Edges:

- a) Hot-glued, 0.018 inch thick minimum, PVC edge-banding, wood grained or solid color to match cabinet.

3) T-Molding (countertop in Accounting Office Room 109 only):

- a) PVC with 5/32 inch slot.
- b) Color: Black.
- c) Size: 1-1/2 inches Type Two Acceptable Products:
 - (1) Model 4542 by Charter Industries.
 - (2) Equal as approved by Architect before installation. See Section 01 6200.

C. Fabrication:

1. Construction:

a. Cabinet Body:

- 1) Use AWS Flush Overlay construction on cabinet bodies.
- 2) If used, install Rail System adjustable shelf supports recessed.

b. Drawers:

- 1) Fabricate with separate, screw-attached drawer front.
- 2) Joints shall be dowel and pressure glued, or lock shoulder, glued, and pin nailed.
- 3) Set bottoms into sides, backs, and subfront with 1/4 inch deep groove with 3/8 inch minimum standing shoulder.
- 4) Every drawer shall have specified drawer guides and pull installed. Install drawer guides with 'Euroscrows', and pulls with through-bolts passing through both front and sub-front.

c. Cabinet Doors:

- 1) Full height, panel product cabinet doors may be fabricated in two pieces and joined on back with metal backplate. Backplate shall match interior door surface color.
- 2) Hinges: Install hinges using plastic insertion dowels for hinges and 'Euroscrows' for baseplates.
- 3) Every cabinet door shall have specified pull installed.

2. Cabinet Component Thickness And Material:

- a. Use plastic laminate facing on panel product, except on following surfaces, where Kortron or Melamine shall be used.

- 1) Cabinet interiors and shelving faces behind cabinet doors in all rooms.
- 2) Cabinet interiors and shelving faces always open to view.
- 3) Cabinet exteriors permanently concealed.
- 4) Drawer sides, backs, bottoms, and subfronts.

- b. Ends, Divisions, Bottoms, Tops: 3/4 inch thick panel product.

- c. Rails: 3/4 inch thick panel product.

d. Shelves:

- 1) Panel product.

- 2) Thickness:
 - a) 30 Inch Span And Less: 3/4 inch thick.
 - b) Spans Over 30 Inches (To 42 Inches: One inch thick.
 - c) Spans Over 42 Inches: One inch thick and provide Hafele or equal center supports.
- e. Backs: 1/4 inch thick panel product.
- f. Doors: 3/4 inch thick panel product.
- g. Drawer Sides, Backs, And Subfronts: 1/2 inch thick minimum panel product.
- h. Drawer Bottoms: 1/4 inch thick panel product.
- i. Separate Drawer Front: 3/4 inch panel product.
- 3. Install plastic grommets in cable access holes in countertops.

2.2 ACCESSORIES

A. Cabinet And Drawer Hardware:

- 1. Cabinet And Drawer Pulls:
 - a. Satin Chromium Plated brass / bronze core bow handles, 4 inches long minimum.
 - b. Type Two Acceptable Products:
 - 1) 4484 by Stanley.
 - 2) Equal as approved by Architect before installation. See Section 01 6200.
- 2. Cabinet And Drawer Locks:
 - a. Pin tumbler type suitable for location. Key individually, except key cabinets and drawers within an Office alike.
 - b. Type Two Acceptable Manufacturers:
 - 1) Comp X National Lock.
 - 2) Olympus Lock.
 - 3) Equal as approved by Architect before installation. See Section 01 6200.
- 3. Cabinet Adjustable Shelf Supports:
 - a. Either of following systems are acceptable, at Fabricator's option:
 - 1) 32mm System: Casework Fabricator's standard.
 - 2) Traditional System:
 - 3) Class Two Quality Standards: 255 and 256 by Knappe & Vogt.
- 4. Cabinet Hinges:
 - a. Description:
 - 1) Cup Hinge (Concealed Hinge or European style).
 - 2) Steel, nickel-plated, full overlay, self closing with dowel, Mod 17.
 - b. Design Criteria:
 - 1) Doors 48 inches High or Less:
 - a) Two (2) hinges.
 - b) Hinge Opening: 165 degree minimum.
 - 2) Doors over 48 inches High:
 - a) Four (4) hinges.
 - b) Hinge Opening: 165 degree minimum.
 - c. Basis of Design: Model 329.03.558 with Model 329.73.510 mounting plate by Hafele:
 - 1) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a) Blum.
 - b) Grass America.
 - c) Hafele.
 - d) Knappe & Vogt.
 - e) Salice.
- 5. Drawer Guides:
 - a. Keyboard / Pencil Drawers:
 - 1) Steel ball bearings, 45 lb load rating minimum.
 - 2) 3/4 extension, top mounting.
 - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Series 2006 by Accuride.
 - b) Article 422.14.345 by Hafele.
 - c) Series KV8200 by Knappe & Vogt.
 - b. Standard Drawers:
 - 1) Full extension, steel ball bearings, 100 lb load rating.

- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Series 3832-Classic by Accuride.
 - b) Article 422.04.552 by Haffele.
 - c) Series KV8400 by Knape & Vogt.
- B. Cabinet Door Bumpers:
 1. Description:
 - a. Polyurethane bumper to protect gypsum board from cabinet handle damage where cabinet handles hit gypsum wallboard surface.
 2. Design Criteria:
 - a. Clear.
 - b. Peel adhesion.
 - c. Size: 3/8 inch diameter x 1/8 inch thick.
 3. Type Two Acceptable Products:
 - a. WS-34 Cylindrical Soft Durometer Cabinet Bumper by Anybumper, Amite, LA www.Anybumper.com.
 - b. Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 06 4512
ARCHITECTURAL WOODWORK WOOD TRIM

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Chair rails.
- B. Related Requirements:
 - 1. Section 06 1100: 'Wood Framing' for wall blocking required for Wood Trim.
 - 2. Section 06 2001: 'Common Finish Carpentry Requirements':
 - a. Installation of chair rails.
 - b. Installation of Wood Trim.
 - 3. Section 06 2210: Remaining Wood Trim.
 - 4. Section 06 4001: 'Common Architectural Woodwork Requirements':
 - a. Approved Fabricators.
 - b. General standards for materials and fabrication of Architectural Woodwork.
 - 5. Section 09 9324: 'Interior Clear-Finished Hardwood'.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Include materials used, standing and running trim profiles, joint details, and hardware.
 - 2. Samples:
 - a. Interior Hardwood for Transparent Finish:
 - 1) Before performing work of this Section, prepare Control Sample, to match sample available from Owner, to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
 - 2) Design Criteria:
 - a) Provide 8 inch by 10 inch 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.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Manufacturers:
 - 1. Approved Fabricators. See Section 06 4001 for Approved Fabricators.
- B. Performance / Design Criteria: Conform to requirements of Section 06 4001 'Common Architectural Woodwork Requirements'.
 - 1. Glue: Waterproof and of best quality.
 - 2. Factory-finish to match Owner selected sample as specified in Section 09 9324.
- C. Architectural Woodwork Wood Trim:
 - 1. Interior Hardwood For Transparent Finish:
 - a. Design Criteria:
 - 1) Solid wood shall be plain sawn Red Oak.
 - 2) Finish to match Owner selected sample as specified in Section 09 9324.
 - 3) Color:
 - a) LDS 110.
- D. Shelves:
 - 1. Conform to applicable requirements of Sections 06 4001 and 06 4114.
 - 2. Use 3/4 inch Kortron or Melamine faced Panel Product with hot glued 3 mm thick PVC edge banding with eased edges. Apply banding on exposed edges with one inch return onto unexposed edges. Edge banding color to match Panel Product.

2.2 SOURCE QUALITY CONTROL

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

PART 3 - EXECUTION Not Used

END OF SECTION

**SECTION 06 6001
MISCELLANEOUS PLASTIC FABRICATIONS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But not Installed Under This Section:
 - 1. Furnish window stools as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 06 2001: 'Common Finish Carpentry Requirements' for:
 - a. Installation of Window Stools.
 - 2. Section 06 4001: 'Common Architectural Woodwork Requirements' for Approved Fabricators.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature.
 - b. Color selections.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Acrylic Solid Surface:
 - a. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.
 - 1) Corian by DuPont Co, Wilmington, DE. Contact Steve Finch at (314) 941-5179 or email stephen.m.finch@dupont.com.
- B. Materials:
 - 1. Acrylic Solid Surface Window Stools:
 - a. Design Criteria:
 - 1) Meet requirements of ANSI/ICPS SS-1.
 - b. General:
 - 1) 1/2 inch thick 100 percent acrylic polymer.
 - c. Approved Colors: As selected by Architect from Manufacturer's standard solid (white or off-white only) colors.
 - 1) Glacier White by Corian.
 - 2) Bisque by Corian.
 - 3) Cameo White by Corian.
 - 4) Vanilla by Corian.
 - d. Approved Color: As selected by Project Manager by Corian.

PART 3 - EXECUTION:**3.1 INSTALLATION**

- A. Install tight to window and jambs.
- B. Extend beyond wall below 3/4 inch and radius corners 1/2 inch.
- C. Secure window stools to framing with silicone sealant as specified in Section 07 9213 'Elastomeric Joint Sealants.'

END OF SECTION

**SECTION 06 6413
PLASTIC PANELING**

PART 1 - GENERAL**1.1 SUMMARY**

A. Includes But Not Limited To:

1. Furnish and install plastic sanitary wall paneling as described in Contract Documents.

1.2 SUBMITTALS

A. Action Submittals:

1. Product Data:

- a. Manufacturer's product literature.

B. Informational Submittals:

1. Manufacturer Instructions:

- a. Manufacturer's written installation instructions.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

A. Manufacturers:

1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.

- a. Glasteel, Moscow, TN www.glasteel.com.

- b. Kemlite, Channahon, IL www.cranecomposites.com.

- c. Marlite FRP Products, Dover, OH www.marlitefrp.com.

- d. Nudo Products Inc, Springfield, IL www.nudo.com.

B. Materials:

1. FRP Sanitary Wall Panels:

- a. 0.090 inch thick, white, with embossed surface.

- b. Color Quality Standard: No. 659 White by Glasteel.

- c. Quality Standard: Glasliner by Glasteel.

2.2 ACCESSORIES

A. Use Panel Manufacturer's standard vinyl moldings at joints, edges, and corners.

PART 3 - EXECUTION: Not Used

END OF SECTION

DIVISION 07: THERMAL AND MOISTURE PROTECTION

07 1000 DAMPPROOFING AND WATERPROOFING

- 07 1113 BITUMINOUS DAMPROOFING
- 07 1900 WATER REPELLENTS

07 2000 THERMAL PROTECTION

- 07 2113 BOARD INSULATION
- 07 2116 BLANKET INSULATION
- 07 2616 BELOW-GRADE VAPOR RETARDERS

07 5000 MEMBRANE ROOFING

- 07 5419 POLYVINYL-CHLORIDE ROOFING: PVC

07 6000 FLASHING AND SHEET METAL

- 07 6210 GALVANIZED STEEL FLASHING AND TRIM
- 07 6240 ALUMINUM FLASHING AND TRIM
- 07 6311 METAL SOFFIT PANELS
- 07 6321 ALUMINUM FASCIA

07 9000 JOINT PROTECTION

- 07 9213 ELASTOMERIC JOINT SEALANTS

END OF TABLE OF CONTENTS

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**SECTION 07 1113
BITUMINOUS DAMPPROOFING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and apply bituminous dampproofing to exterior foundation walls and top of footings as described in Contract Documents, including but not limited to:
 - a. Building.
- B. Related Requirements:
 - 1. Section 03 3111: 'Cast-in-Place Structural Concrete'

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's product literature or cut sheet products provided.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
 - 1. Maintain dampproofing at 40 deg F or above before application.

1.4 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Do not apply when ambient temperature is below 40 deg F, surface temperature is below 33 deg F, or when rain is expected before applied dampproofing will dry.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Bituminous Dampproofing:
 - 1. Type Two Acceptable Products:
 - a. Ecomul-11 by Epro Waterproofing Systems, Derby, KS www.eproserv.com.
 - b. Henry 788 by Henry Company, El Segundo, CA www.henry.com.
 - c. Karnak 100 by Karnak Chemical Corp, Clark, NJ www.karnakcorp.com.
 - d. Sealastic Asphalt Emulsion Dampproofing Type I by W R Meadows, Hampshire, IL www.wrmeadows.com.
 - e. Equal as approved by Architect before application. See Section 01 6200.

PART 3 - EXECUTION**3.1 APPLICATION**

- A. General:
 - 1. Apply dampproofing to cover area from 7 inches below finish grade line down to and including top of footings.
 - 2. Apply to all below-grade portions of exterior walls, including both concrete and masonry.
- B. Methods:
 - 1. Spray Application:
 - a. Spray two applications to a thickness of 10 mils minimum.
 - 2. Brush / Roller Application:
 - a. Apply two coats of dampproofing at rate recommended by Manufacturer.
 - b. Apply coats in cross hatch method so coats are applied perpendicular to each other.
 - c. Before applying second coat allow first coat to dry in accordance with Manufacturer's recommendations.
- C. Do not backfill against bituminous dampproofing for twenty four (24) hours after application.

END OF SECTION

**SECTION 07 1900
WATER REPELLENTS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and apply water repellent system to exposed exterior masonry that will not be painted as described in Contract Documents.
- B. Related Requirements:
 - 1. Section: 04 2223: 'Architectural Concrete Unit Masonry'.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference: Schedule pre-installation conference for same time as application of test application.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: Manufacturer's product data including data substantiating that specified materials are recommended by Manufacturer for applications shown.
- B. Informational Submittals:
 - 1. Manufacturer Instructions: Printed application instructions.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Comply with applicable VOC standards and other local requirements.
- B. Qualifications:
 - 1. Installer:
 - a. Installer shall be acceptable to Manufacturer as applicator of its product.
 - b. Minimum five (5) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.
- C. Preconstruction Testing:
 - 1. Test substrate for moisture content. Do not apply if moisture contents of wall not within limits acceptable to Manufacturer.
 - 2. Apply 10 foot square test application for review of substrate preparation procedures and application methods.

1.5 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Temperatures at time of application:
 - a. Siloxane: Between 40 and 100 deg F.
 - 2. No precipitation shall have occurred within 24 hours of application or be expected for 48 hours minimum after completion of application.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Type One Acceptable Products:
 - 1. Siloxane:
 - a. Prime A Pell 200 by Chemprobe, Div Tnemec, North Kansas City, MO www.tnemec.com.
 - b. Rainstopper 600 by TexCote - Textured Coatings of America, Panama City, FL www.texcote.com.
 - c. Sure Klean Weather Seal Siloxane WB Concentrate by ProSoCo, Lawrence, KS www.prosoco.com.
 - d. Weather Worker WB (J-26-WB) by Dayton Superior Specialty Chemicals, Kansas City, KS www.daytonsuperiorchemical.com.
 - 2. Equals as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Do not apply until after installation of sealants in areas to receive water repellants and adjoining areas.
- B. Clean substrate of substances that will interfere with penetration and adhesion of water repellent.
- C. Protect adjoining work from spillage or blow-over as recommended by Manufacturer.

3.2 APPLICATION

- A. Apply two heavy saturation spray coats beginning at bottom of walls and following Manufacturer's written application instructions.

3.3 CLEANING

- A. Immediately clean adjoining surfaces of spillage and overspray as recommended by Manufacturer.

END OF SECTION

**SECTION 07 2113
BOARD INSULATION**

PART 1 - GENERAL**1.1 SUMMARY****A. Includes But Not Limited To:**

1. Furnish and install board insulation on interior side of perimeter foundation walls and under floor slabs as described in Contract Documents.

1.2 ADMINISTRATIVE REQUIREMENTS**A. Coordination:**

1. Installation of Polyethylene Film Vapor Retarder as specified in Section 07 2616 with Type 1 Insulation (Below Grade).

1.3 SUBMITTALS**A. Action Submittals:**

1. Product Data:
 - a. Provide manufacturer's technical data for insulation.

B. Informational Submittals:

1. Manufacturer Instructions:
 - a. Written installation 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.

1.4 QUALITY ASSURANCE**A. Regulatory Agency Sustainability Approvals:**

1. Insulation shall be manufactured to be in compliance with International Code Council (IBC) or other applicable building codes.
2. Fire-Test-Response Characteristics: As determined by test method indicated below by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Surface-Burning Characteristics:
 - 1) Insulation shall have Class A flame spread rating in accordance with ASTM E84 or UL 723.
 - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
 - b) Flash point: None.
3. Fire-Test-Response Characteristics: As determined by test method indicated below by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Surface-Burning Characteristics:
 - 1) Insulation shall have Class A flame spread rating in accordance with ASTM E84, UL 723, or UL 1715 Type 1.
 - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
 - b) Flash point: None.
4. Qualifications:
 - a. Installer: Firm which has at least three (3) years experience in work of type required by this specification.

1.5 DELIVERY, STORAGE, AND HANDLING**A. Delivery And Acceptance Requirements:**

1. Materials shall be delivered in original, unopened packages with labels intact. Exercise care to avoid damage during unloading.
2. Deliver materials in sufficient quantities to allow continuity of work.

B. Storage And Handling Requirements:

1. Store, protect and handle materials in accordance with Manufacturer's recommendations to prevent damage, contamination and deterioration. Keep material free of dirt and other foreign matter.
2. Store in cool, dry area away from sources of heat, flame, ignition and strong oxidizing agents.
3. Following Manufacturer's instructions for protection when handling and cutting insulation.

1.6 WARRANTY**A. Manufacturer Warranty:**

1. Manufacturer's Insulation Warranty.

PART 2 - PRODUCTS**2.1 MANUFACTURERES**

- A. Manufacturer Contact List:
 - 1. Owens Corning, Toledo, OH www.owens-corning.com.
 - 2. Dow Chemical, Midland, MI www.dow.com or Dow Canada, Sarnia, ON www.dow.com.

2.2 MATERIALS

- A. Board Insulation:
 - 1. Description:
 - a. Extruded polystyrene foam insulation for use above and below grade.
 - 2. Design Criteria:
 - a. Meet requirements of ASTM C578, Type IV.
 - b. Close-cell foam insulation.
 - c. Meet requirements of ASTM E84 or UL 723 for 'surface burning characteristics of building materials'.
 - d. Perimeter Insulation:
 - 1) Butt type, minimum RSI 1.7 (R-10), 2 inches thick by 24 inches by standard length.
 - 3. Type One Acceptable Products:
 - a. Foamular 250 by Owens Corning.
 - b. Styrofoam Scoreboard Extruded Polystyrene Foam Insulation by Dow Chemical.
 - c. Equal as approved by Architect before bidding. See Section 01 6200.

2.3 ACCESSORIES

- A. Fasteners:
 - 1. Tapping screws with washers.
 - a. As recommended by Manufacturer.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verification Of Conditions:
 - 1. Prior to all work of this section, carefully inspect installed work of all other trades and verify that all such work is complete to point where installation may properly commence.
 - 2. Verify insulation may be installed in accordance with original design an manufacturer's recommendations
 - 3. Discrepancies:
 - a. In event of discrepancy, immediately notify Architect.
 - b. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATION

- A. General: Install insulation in compliance with International Code Council (IBC) or other applicable building codes and in accordance with Manufacturer's current recommendations.
- B. Type 1 Insulation (Below Grade):
 - 1. Remove ties and concrete protrusions that would keep insulation from fully contacting foundation wall face.
 - 2. Install against interior side of perimeter foundation walls extending downward from top of slab 48 inches or to top of footing, whichever is less. Install using 3/8 inch beads of adhesive at 12 inches on center vertically and at each vertical and horizontal joint to completely seal insulation.

3.3 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
 - 1. Upon completion of installation, visually inspect each insulated area and verify that all insulation is complete and properly installed.
- 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 not complying with contract document requirements at no additional cost to the Owner.

3.4 CLEANING

- A. Waste Management:
 - 1. Remove from site debris resulting from work of this Section.

END OF SECTION

**SECTION 07 2116
BLANKET INSULATION**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install faced thermal batt insulation with spindle-type anchors as described in Contract Documents.
 - 2. Furnish and install unfaced thermal batt insulation in metal frames and acoustic batt insulation as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for furnishing and installing of insulation in hollow metal door frames.

1.2 QUALITY ASSURANCE

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

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Manufacturers:
 - 1. Insulation:
 - a. Type One Acceptable Manufacturers:
 - 1) Certaineed Corp, Valley Forge, PA www.certaineed.com.
 - 2) Guardian Fiberglass, Greer, SC www.guardianbp.com.
 - 3) Johns Manville, Denver, CO www.jm.com.
 - 4) Knauf Fiber Glass, Shelbyville, IN www.knaufusa.com.
 - 5) Owens-Corning Fiberglass Corporation, Toledo, OH www.owens-corning.com.
 - 6) Thermafiber, Wabash, IL www.thermafiber.com.
 - b. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Materials:
 - 1. Thermal And Acoustic Insulation:
 - a. Order insulation by 'R' value rather than 'U' value, rating, or thickness, either 16 or 24 inches wide according to framing spacing.
 - b. Faced Insulation:
 - 1) Kraft faced meeting requirements of ASTM C665, Type II, Class C.
 - a) Attached with Spindle-Type Anchors as shown on Contract Drawings.
 - 2) Foil faced meeting requirements of ASTM C665, Type III.
 - a) Class A: Exposed insulation.
 - b) Attached with Spindle-Type Anchors as shown on Contract Drawings.
 - c. Unfaced Insulation:
 - 1) Meet requirements of ASTM C665, Type I.
 - d. 'R' Value Required:
 - 1) Ceilings:
 - a) Thermally Insulated: R38 Standard.
 - 2) Metal Wall Stud Framing: Unfaced Insulation.
 - a) 'R' Values shown on Wall Types Plan sheet.

2.2 ACCESSORIES SYSTEMS

- A. Spindle-Type Anchors:
 - 1. Description:
 - a. Spindle welded to plate and including self-locking washer.
 - b. Perforated, galvanized carbon-steel plate 0.030 inch thick by 2 inches square plate with copper-coated, low carbon steel, fully annealed, 0.105 inch diameter spindle, length to suit depth of insulation.
 - 2. Type One Acceptable Products:
 - a. Series T TACTOO Insul-hangers, RC150 or SC150 washers, and TACTOO Adhesive by AGM Industries, Brockton, MA www.agmind.com.
 - b. Stic-Klip Type N Fasteners and Stic-Klip Type S Adhesive by Eckel Industries of Canada Ltd, Morrisburg, ON www.eckel.ca.
 - c. Spindle Anchor, Dome-cap, R-150, or S-150 washer, Clutch-clip, and Tuff Bond Hanger Adhesive by GEMCO, Danville, IL www.gemcoinsulation.com.
 - d. Equal as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION**3.1 INSTALLATION****A. General:**

1. Leave no gaps in insulation envelope.
2. If two layers of insulation are used to attain required 'R' value, only layer towards interior of building shall have facing.
3. Provide minimum clearance around recessed lighting fixtures as approved by local code.

B. In Framing:

1. Install insulation behind plumbing and wiring, around duct and vent line penetrations, and in similar places.
2. Fit ends of batts snug against top and bottom plates.
3. Fit batts snug against stud framing at each side.

C. Surface-Applied, Exposed on Masonry Walls:

1. Install adhesively applied spindle-type anchors at 12 inches each way.
2. After adhesive has dried, install insulation using foil-faced insulation only. Do not compress insulation below specified thickness and secure with specified washers.
3. Apply capped washers to tips of spindles.

END OF SECTION

SECTION 07 2616
BELOW-GRADE VAPOR RETARDER

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Vapor retarder, seam tape, and penetration accessories for installation under interior slabs-on-grade.
- B. Related Requirements:
 - 1. Section 31 1123: 'Aggregate Base' for installation of vapor retarder under aggregate base under concrete slab.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature or cut-sheets.
 - 2. Samples:
 - a. Vapor Retarder:
 - 1) Submit sample of specified vapor retarder.
- B. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. Independent laboratory test results showing compliance with ASTM C1745 Standard.
 - 2. Source Quality Control Submittals:
 - a. Vapor Retarder:
 - 1) Installation, seaming, and penetration boot 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:
 - b. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's documentation showing compliance to Contract Documents.

1.3 WARRANTY

- A. Manufacturer Warranty:
 - 1. Manufacturer standard warranty to be free of defects and installed without damage.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Fortifiber, Reno, NV www.fortifiber.com.
 - b. Insulation Solutions, East Peoria, IL www.insulationsolutions.com.
 - c. Inteplast Group, Livingston NJ www.BarrierBac.com.
 - d. Raven Industries, Sioux Falls, SD www.ravenind.com.
 - e. Reef Industries, Houston, TX www.reefindustries.com.
 - f. Stego Industries, San Juan Capistrano, CA www.stegoindustries.com.
 - g. W R Meadows, Hampshire, IL www.wrmeadows.com.
- B. Materials:
 - 1. Vapor Retarder:
 - a. Design Criteria:
 - 1) Meet requirements of ASTM E1745, Class A rating.
 - 2) Thickness: 15 mil minimum.
 - 3) Physical Properties:
 - a) Water Vapor Pemeance ASTM E96, Method A Perm 0.01
 - b) Puncture Resistance ASTM D1709.
 - b. Category Four Approved Products. See Section 01 6200 for definition of Categories.
 - 1) Barrier-Bac VB-350 (16 mil) by Inteplast Group.
 - 2) Griffolyn 15 by Reef Industries.
 - 3) Moistop Ultra 15 Underslab Vapor Retarder by Fortifiber.
 - 4) Perminator (15 mil) by W R Meadows.
 - 5) Stego Wrap by Stego.
 - 6) Vapor Block 15 by Raven Industries.
 - 7) Viper Vaporcheck II (15 mil) by Insulation Solutions.

2.2 ACCESSORIES**A. Vapor Barrier:**

1. Seam Tape: As recommended by Membrane Manufacturer for continuous taping of seams and sealing of penetration boots.
2. Penetration Boots at Utility Penetrations:
 - a. Quality Standard: Factory fabricated pipeboots:
 - 1) Moistop: The Boot.
 - 2) Raven: VaporBoot.
 - 3) Reef Industries: VaporBoot.
 - 4) All Others:
 - a) Other Manufacturer's boot system.
 - b) or
 - c) Field fabricated from same material as vapor retarder membrane.

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

SECTION 07 5419
POLYVINYL-CHLORIDE ROOFING: PVC

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install roofing membrane with flashings and other components to comprise total roofing system as described in Contract Documents including:
 - a. Single-ply membrane.
- B. Related Requirements:
 - 1. Section 06 0573: 'Preservative Wood Treatment' for roof related blocking and roof nailers.
 - 2. Section 06 1100: 'Wood Framing' for roof related blocking, nailing and sheathing.
 - 3. Section 06 2001: 'Common Finish Carpentry Requirements' for wood nailers, curbs and blocking.
 - 4. Section 07 6220: 'Stainless Steel Flashing And Trim' for metal work installation and requirements.
- C. Products Installed But Not Furnished Under This Section:
 - 1. Sheet metal work including caps, sleeves, umbrella hoods, pipe enclosures boxes, strapping, and scuppers.
- D. Related Requirements:
 - 1. Division 07 for sheet metal work specialties and accessories.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in MANDATORY pre-installation conference.
 - a. Roofing Installer's Foreman and those responsible for installation of roofing to be in attendance. Include Roofing Manufacturer's Representative if available.
 - 2. Schedule pre-installation conference at project site after installation of roof deck including pipe and flue penetrations, but before application of any roofing system component.
 - 3. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review Manufacturer's written instructions.
 - b. Review if Project is in high wind area.
 - c. Review delivery, storage, and handling requirements.
 - d. Review ambient conditions requirements.
 - e. Review roofing installation requirements including flashing and penetrations.
 - f. Review roofing drainage requirements.
 - g. Review temporary protections for roofing system.
 - h. Review cleaning and disposal requirements.
 - i. Review Special Procedure Submittal for Warranty Information to be given to Manufacturer before Manufacture will issue Roof Warranty by Installer.
 - j. Review safety issues.
 - k. Review field inspections and non-conforming work requirements.
 - l. Review protection of membrane by other trades after installation of membrane.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature or cut sheet for each element of system.
 - b. Manufacturer's preparation and installation instructions and recommendations.
 - 2. Shop Drawings:
 - a. Prepared by Roofing Installer and approved by Roofing Membrane Manufacturer and include following:
 - 1) Base flashings.
 - 2) Location and type of penetrations.
 - 3) Membrane terminations.
 - 4) Outline of roof and roof size.
 - 5) Perimeter and penetration details.
 - 6) Roof insulation:
 - a) Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 - b) Taper insulation, including slopes.
 - 7) Special details and materials.
 - b. Confirm that specified FM Class and UL Class assembly is appropriate for Project location.
 - c. Include approved copy of Manufacturer's Notice of Award or Assembly Letter.

3. Samples:
 - a. Manufacturer's 4 inch square minimum sample representing actual color, membrane and thickness.
- B. Informational Submittals:
 1. Certificates:
 - a. Installer's signed certificate stating roofing system complies with Contract Documents performance requirements and work only performed by trained and authorized personnel in those procedures.
 - b. Manufacturer's signed certificate that roof system has been inspected by Technical Service Representative and stating no deviation from system specified or approved shop drawings without written approval by Owner Representative and Manufacturer.
 2. Test And Evaluation Reports: Submit evidence that roof system has been tested and approved or listed as follows:
 - a. Submit evidence that roof system has been tested and approved or listed to meet Factory Mutual Research Corporation (FM) Classification required for this Project.
 - b. Submit evidence that roof system has been tested to meet UL Class requirement required for fire-resistance rating for this Project.
 3. Manufacturer Instructions:
 - a. Two (2) copies of Roofing Manufacturer's published instructions for Architect and maintain one (1) at job-site.
 4. Special Procedure Submittals:
 - a. Installer to fill out 'Roof Manufacturer' Installer Workmanship Warranty' and 'Manufacturer System Warranty' from information provided in the Attachment 'Roofing Manufacturer's Information For Architect' from Manufacturer and from Architect. Warranties are to be included in Closeout Submittals.
 5. Qualification Statement:
 - a. Roofing Manufacturer's certification of Installer.
- C. Closeout Submittals:
 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation:
 - 1) Final, executed copy of 'Roofing Manufacturer System Warranty' including wind speed coverage and required Owner mandatory information.
 - 2) Final, executed copy of 'Roof Installer Workmanship Warranty' including required Owner mandatory information.
 - 3) Verify mandatory information as specified in Special Procedure Submittal has been included in Final Warranty.
 - b. Record Documentation:
 - 1) Manufacturers Documentation:
 - a) Record Shop Drawings if requested. Record shop drawings shall be given shop drawing number by Roofing Manufacturer.
 - b) Certificate: Manufacturer Inspection report by Technical Service Representative.
 - c) Certificate: Installer statement of compliance for performance requirements.
 - d) Test And Evaluation Report: UL fire-resistance rating test report.
 - e) Test And Evaluation Report: Factory Mutual Research Classification approval.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Requirements:
 1. Roof system will meet requirements of all federal, state, and local codes having jurisdiction (AHJ).
 2. Fire Characteristics Performance Requirement:
 - a. Roof system will achieve UL Class A rating when tested in accordance with ASTM E108 or UL 790:
 - 1) Materials shall be identified with appropriate markings of applicable testing agency.
 3. Thermal Performance Requirement:
 - a. Roof system will achieve minimum R value not less than 30.
- B. Qualifications:
 1. Requirements of Section 01 4301 applies but not limited to the following:
 - a. Installers Qualifications:
 - 1) Provide documentation if requested by Architect:
 - a) Roofing Installer shall be approved and authorized by Roofing System Manufacturer to install Manufacturer's product and eligible to receive Manufacturer's special warranty before bid.

- b) Roofing Installer shall be able to document roofing membrane installation for five (5) year minimum.
- c) Roofing Installer must have current license for the city, county, and state where project is located.
- d) Roofing Installer must have license for specific type of roofing work to be preformed.
- e) Roofing Installer's foreman shall be skilled in his trade and qualified to lay out and supervise the Work.
- f) Membrane and flashing installation shall be performed by personnel trained and authorized by Roofing Manufacturer.
- g) Welding equipment shall be provided by or approved by Roofing Manufacturer. Mechanics intending to use equipment shall have successfully completed training course provided by Manufacturer's Technical Representative before welding.
- b. Manufacturer Qualifications:
 - 1) Manufacturer shall manufacture membrane material for five (5) consecutive years.
 - a) No product with documented failure will be allowed.
 - 2) Manufacturer that is UL listed for membrane roofing system used for this Project.
 - 3) Source Limitations:
 - a) Provide roof components including roof insulation and fasteners for roofing system from same Manufacturer as membrane roofing or approved by Roofing Membrane Manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Make no deliveries to Project until installation is about to commence, or until approved storage area is provided.
 - 2. Deliver products job site in original unopened containers or wrappings bearing all seals and approvals.
 - 3. Deliver materials in sufficient quantities to allow continuity of work.
 - 4. Remove any material not approved from job site.
- B. Storage And Handling Requirements:
 - 1. General:
 - a. Follow Manufacturer's instructions and precautions for storage of materials.
 - b. Handle and store roofing materials and place equipment in manner to avoid permanent deflection of roof decking.
 - c. Material Safety Data Sheets (MSDS) must be on location always during transportation, storage and application of materials.
 - 2. Storage Requirements:
 - a. Protection:
 - 1) Protect roof materials from physical damage, moisture, soiling, and other sources in a clean, dry, protected location and with temperature range required by Manufacturer. Protect from direct sunlight.
 - 2) Provide continuous protection of materials against moisture absorption (Manufacturer's/Supplier's shrink wrap is not accepted waterproofing).
 - 3) Store membrane rolls lying down on pallets fully protected from weather with clean canvas tarpaulins.
 - b. Roof Insulation:
 - 1) Comply with insulation Manufacturer's written instructions for handling, storing, and protection during installation.
 - c. Safety:
 - 1) Store flammable materials in cool, dry area away from sparks, open flames, or excessive heat. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
 - 2) Liquid materials such as solvents and adhesives shall be stored off site and installed away from open flames, sparks, and excessive heat.
 - 3) Site storage is acceptable if liquid materials are placed in a locked, sealed storage container.
 - 4) Situate equipment and materials so as to preclude danger, disturbance, or interference to public safety and traffic, and to not constitute fire hazard.
 - d. Temperature:
 - 1) Store adhesives at temperatures above 40 deg F and below 180 deg F.

- e. Unacceptable Material:
 - 1) Remove from job site materials that are determined to be damaged by Architect or by Roofing Manufacturer and replace at no additional cost to Owner.
 - 2) Remove all wet and damaged materials from site.
 - 3) Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- 3. Handling Requirements:
 - a. Select and Handle operating equipment so as not to damage existing construction or new roofing system, or to overload structural system.
 - b. Handle rolled goods so as to prevent damage to edge or ends.

1.6 FIELD CONDITIONS

A. Ambient Conditions:

- 1. Temperature ranges shall be within tolerances allowed for material being used.
 - a. Roof surface shall be free of ponding water, ice, and snow.
 - b. Cold temperature:
 - 1) Follow Manufacturer's written instructions for cold temperature requirements before applying membrane adhesive:
 - a) Follow specified precautions.
 - b) Expose only enough adhesive to be used as directed by membrane manufacturer:
 - c) Low VOC restrictions (if required by local AHJ): Temperatures to be 40 deg F and rising before applying.
 - c. Hot temperature:
 - 1) Do not expose membrane and accessories to constant temperature in excess of 180 deg F.
- 2. Proceed with roofing work when existing and forecasted weather conditions permit.

1.7 WARRANTY

A. Manufacturer Warranty:

- 1. Roofing Membrane Manufacturer's Special Warranty for:
 - a. Thirty (30) year no dollar limit (NDL) material and labor warranty covering roofing system, including insulation, components of membrane roofing system and flashing degradation and workmanship.
 - b. Accidental Puncture Warranty:
 - 1) Membrane Manufacturer's written LDS Accidental Puncture Warranty for up to sixteen (16) hours of Labor to repair punctures after final inspection.
 - c. Warranty shall include wind speed coverage to 90 mph

B. Roof Installer Workmanship Warranty:

- 1. Written five (5) year guarantee covering workmanship and repairs or replacement of work without cost to Owner, counter-signed by Installer and General Contractor from date of installation:
 - a. Roof Installer Workmanship Warranty must include information required in Attachment 'Warranty Information'.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturer:

- 1. Category One VMR Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Sika Sarnafil, Canton, MA (800) 576-2358 or (781) 828-5400. www.sikacorp.com.
 - 1) Contact Information (USA, Canada and Global):
 - a) Primary Contact: Steve Moosman, District Manager, office (801) 575-8648 x101 cell (801) 201-6269 moosman.steve@us.sika.com.
 - b) Secondary Contact: Jim Greenwell, Mountain Region Manager: office (801) 575-8648 x108 cell (801) 455-3838 greenwell.jim@us.sika.com.

B. Design Criteria:

- 1. General:
 - a. Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - b. Membrane roofing and base flashings shall remain watertight.
- 2. Drainage Requirement:
 - a. Roof system to provide positive drainage where all standing water dissipates within forty eight (48) hours after precipitation ends.

3. Material Compatibility:
 - a. Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane Roofing Membrane Manufacturer based on testing and field experience.
4. Metal details, fabrication practices, and installation methods shall conform to applicable requirements of following:
 - a. Factory Mutual Loss Prevention Data Sheet 1-49, 'Perimeter Flashing' (latest issue).
 - b. Sheet Metal and Air Conditioning Contractors National Association Inc, 5th edition.
- C. Components:
 1. Membrane:
 - a. Description:
 - 1) 'Mechanically Attached':
 - a) Meet requirements of ASTM D4434/D4434M, Type III:
 - b) Category One VMR Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Sika Sarnafil: S327 polyester reinforced membrane:
 - (a) Rhinobond attached system.
 - b. Thickness:
 - 1) Field membrane: Thickness: 80 mil by optimum width and length determined by job conditions.
 - 2) Flashing membrane: Thickness: 0.60 mil by optimum width and length determined by job conditions.
 - c. Surface Color:
 - 1) White.
 2. Insulation:
 - a. FM and UL approved.
 - b. If required by Manufacturer for warranty, provide approved facer.
 - c. Polyisocyanurate Foam Insulation Board:
 - 1) Meet requirements of ASTM C1289.
 - 2) Boards shall be Factory Mutual approved for classification selected for project.
 - 3) Facer:
 - a) Fiber reinforced paper facer or coated-glass fiber mat facer.
 - 4) Insulation panels directly under roofing membrane and roof system cover board shall not exceed 48 inches by 96 inches.
 - 5) Panels to be 2 inches maximum thickness for each layer. Insulation shall be multiple layers and achieve minimum 'R' value of 30. Tapered layer shall slope at 1/4 in per ft.
 3. Roof System Cover Board (Recovery/Hard Board) Over Insulation:
 - a. Fire Rating:
 - 1) Fire Protection Board On Deck:
 - a) Category One VMR Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) 5/8 inch thick minimum Dens-Deck Fireguard Roof Board by G-P Gypsum.

2.2 ACCESSORIES

- A. Adhesives, Sealants and Sealer:
 1. General:
 - a. Supplied by Roofing Membrane Manufacture Meet uplift and VOC requirements required for Project for specific application method and in compliance with all local codes and restrictions provided by Roofing Membrane Manufacture.
 - b. As accepted by Roofing Manufacturer under specified warranty.
 2. Pourable Sealer:
 - a. Approved by Roofing Membrane Manufacturer for specified roof system.
 3. Membrane:
 - a. Category One VMR Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Sika Sarnafil:
 - a) Sarnacol 2170: Solvent based membrane adhesive.
 4. Insulation:
 - a. Category One VMR Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Sika Sarnafil:
 - a) Sarnacol 2163/AD/OM: Low rise polyurethane foam adhesive.

- B. Coated Metal:
 - 1. Colors:
 - a. Not Seen From Ground: Color to match selected roof membrane.
 - b. Seen From Ground: Manufacturer's standard color as selected by Architect to match membrane surface color chosen for project.
 - 2. Category One VMR Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Sika Sarnafil:
 - 1) 25 ga G90 galvanized sheet metal laminated with 0.020 inch thick membrane:
 - 2) Sarnclad membrane cover strips:
 - a) 0.060 inch thick.
 - b) Color to match selected Sarnaclad.
- C. Counterflashing:
 - 1. Formed to meet design requirements and match existing metals and aesthetics, furnished by Membrane Manufacturer.
- D. Mechanical Attachment Accessories:
 - 1. Rhinobond Plates:
 - a. Category One VMR Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Sika Sarnafil:
 - a) Plates engineered as companion assembly with Sarnafasteners.
 - b) Used to secure insulation, hardboard, and membrane as required by Membrane Manufacturer.
 - 2. Bars And Plates:
 - a. Category One VMR Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Sika Sarnafil:
 - a) Bars and plates engineered as companion assembly with Sarnafasteners. Used to secure membrane and/or flashing as required by Membrane Manufacturer.
- E. Miscellaneous Fasteners and Anchors:
 - 1. Fasteners, anchors, nails, straps, bars, etc. shall be of post-galvanized zinc or cadmium-plated steel, aluminum, or stainless steel. Mixing metal types and methods of contact shall be in such manner as to avoid galvanic corrosion.
 - 2. Compatible with substrates and flashings to be anchored:
 - a. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins.
 - b. Concrete fasteners and anchors shall have minimum embedment of 1-1/4 inch and shall be approved for such use by Fastener Manufacturer.
 - c. Wood fasteners and anchors shall have embedment of one inch minimum and be approved for such use by Fastener Manufacturer.
- F. Prefabricated Flashing Accessories: Membrane corners and pipe stacks as supplied by Membrane manufacturer.
- G. Traffic Surface:
 - 1. Standard Walkway:
 - a. Description:
 - 1) Traffic surface used to protect roof membrane with limited slip surface.
 - 2) Approved for all wind load areas.
 - 3) Heat weldable walk roll.
 - b. Category One VMR Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Sika Sarnafil:
 - a) SarnaTred Walkway Roll.
- H. Wood Nailers:
 - 1. Treat wood nailers as per Section 06 0573.
 - 2. Wood nailers shall conform to Factory Mutual's Loss Prevention Data Sheet 1-49.
 - 3. Wood shall have maximum moisture content of 19 percent by weight on dry weight basis.

PART 3 - EXECUTION

3.1 INSTALLERS

- A. Installers shall be pre-approved by VMR Manufacturers.

3.2 EXAMINATION

- A. Verification Of Conditions:
 - 1. Examine deck to determine if it is satisfactory for installation of roofing system:
 - a. Inspect for defects such as excessive surface roughness, contamination, structural inadequacy, or any other condition that will adversely affect quality of work.

- b. Verify that roof drain lines are functioning correctly before starting work of this Section. Report such blockages in writing to Architect, with copy to Roofing Manufacturer, for corrective action before beginning work of this Section.
 - c. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and nailers match thicknesses of insulation to be installed.
 - 2. Notify Architect of unsuitable conditions in writing:
 - a. Commencement of Work by installer is considered acceptance of substrate.
 - b. Stop work immediately if any unusual or concealed condition is discovered and immediately notify Architect in writing, with letter copy to Roofing Manufacturer.
 - c. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Examination And Assessment:
 - 1. Examine decks for adequacy before commencing work. Requirements shall include but not limited to the following:
 - a. Designed slope required for proper drainage.
 - b. Location of roof drains.
 - c. Moisture conditions that will adversely affect quality of work.
 - d. Other condition incompatible with good roofing practice.
 - 2. Notify Architect in writing of conditions with letter copy to Roofing Membrane Manufacturer that would limit guarantee on part of Manufacturer or applicator.

3.3 PREPARATION

- A. Surface Preparation:
 - 1. General:
 - a. Substrate shall be clean, smooth, dry, and free of flaws, sharp edges, loose and foreign material, oil and grease. Roofing shall not start until defects have been corrected.
 - b. Provide temporary walkways and work platforms as necessary to complete work under this section with no damage to surfaces exposed during work.
 - c. Coordinate application of membrane to provide protection of underlying materials from wetting or other damage by the elements on a continuous basis.
 - d. Sheet metal sleeves, caps, and enclosures shall be completely installed on a daily basis.
 - e. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
 - f. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast.
 - g. Remove and discard temporary seals before beginning work on adjoining roofing.
- B. Wood Nailers:
 - 1. Install continuous treated wood nailers at perimeter of entire roof and around roof projections and penetrations as described on Contract Drawings by Section 06 1100 'Wood Framing'.

3.4 INSTALLATION

- A. Interface With Other Work:
 - 1. Coordinate with Installers whose work penetrates roof deck or requires men and equipment to traverse roof deck.
- B. General:
 - 1. Installation shall be in conformance with latest edition of manufacturer's specification except where Contract Documents are more restrictive.
 - 2. Roof surfaces shall be free of water, ice and snow. Surfaces to receive insulation, membrane, or flashings shall be dry. Should surface moisture occur, provide equipment necessary to dry surface before application.
 - 3. Secure new and temporary construction, including equipment and accessories, so as to preclude wind blow-off and subsequent roof or equipment damage.
 - 4. Install only as much roofing as can be made weathertight each day, including flashing and detail work. Clean seams and heat-weld before leaving jobsite.
 - 5. Schedule and execute work without exposing interior building areas to effects of inclement weather. Protect existing building and its contents against all risks.
 - 6. Before and during application, remove dirt, debris, and dust from surfaces either by vacuuming, sweeping, blowing with compressed air, or similar methods.
 - 7. Report rooftop contamination that is anticipated or that is occurring to Roofing Manufacturer to determine corrective steps to be taken.

- C. Insulation:
 - 1. Install insulation as recovery layer over substrate and to obtain desired thermal value. Roof assembly shall be dry.
 - 2. Neatly cut insulation cut to fit around penetrations and projections.
 - 3. Install tapered insulation in accordance with insulation manufacturer's shop drawings.
 - 4. Install tapered insulation around drains creating a drain sump.
 - 5. Do not install more insulation board than can be covered with roofing membrane by end of day's work or onset of inclement weather.
 - 6. 'Mechanically Attached' Attachment:
 - a. Fasten to deck with approved fasteners and plates in accordance with Insulation Manufacturer, Factory Mutual, and Roofing Manufacturer recommendations for fastening rates and patterns.
 - b. Quantity and locations of fasteners and plates shall also result in insulation boards resting evenly on roof deck/substrate so there are no large cavities or air spaces between boards and substrate.
 - c. Install fasteners in accordance with fastener manufacturer's recommendations:
 - 1) Fasteners are to have minimum penetration into structural deck as recommended by Fastener Manufacturer and Roofing Manufacturer.
- D. Roof System Cover Board:
 - 1. Offset roof system cover board joints 24 inches minimum from joints in underlying substrate or insulation.
- E. Membrane:
 - 1. Inspection:
 - a. Inspect surface of insulation or substrate before installation of roof membrane.
 - b. Substrate shall be clean, dry and smooth with no excessive surface roughness, contaminated surfaces or unsound surfaces such as broken, delaminated, or damaged insulation boards.
 - c. All sharp projections shall be removed by sweeping, blowing or vacuum cleaning.
 - 2. 'Mechanically Attached':
 - a. In Seam Option:
 - 1) Unroll and position membrane without stretching. Provide and secure both perimeter and field membrane sheets in accordance with manufacturer's most current specifications and details.
 - 2) Install adjoining membrane sheets in same manner in accordance with manufacturer's specifications.
 - b. Rhinobond Option:
 - 1) Preparation: Using test strip of membrane and loose Rhinobond plates, provide at least four (4) varied heat settings to calibrate Rhinobond welder for operation during each work period.
 - 2) Roll out and set membrane. Follow Manufacturer's written instructions:
 - a) Provide 3 inches shingled lap seaming area in all membrane overlaps.
 - b) Weld random perimeter Rhinobond plates to secure field membrane from shifting during seam and field welds.
 - c) Identify remaining Rhinobond plates and weld membrane using repeated leap frog method of welding followed by placement of cooling magnets.
 - 3. Hot-Air Welding Of Lap Areas:
 - a. General:
 - 1) Seams shall be hot air welded. Seam overlaps shall be 3 inches wide minimum when automatic machine welding, and 4 inches wide when hand welding.
 - 2) Membrane to be welded shall be clean and dry. No adhesive shall be in seam.
 - 3) Hand Welding:
 - a) Hand welded seams shall be completed in three stages. Allow hot-air welding equipment to warm up for one (1) minute minimum before welding.
 - 4) Seam shall be tack-welded every 36 inches to hold membrane in place.
 - 5) Weld back edge of seam with narrow but continuous weld to prevent loss of hot air during final welding.
 - 6) Insert nozzle into seam at 45 degree angle. Once proper welding temperature has been reached and membrane begins to 'flow', position hand roller perpendicular to nozzle and press lightly. For straight seams, use 1-1/2 inch wide nozzle. Use 3/4 inch wide nozzle for corners and compound connections..

- b. Machine Welding: Follow Roofing Manufacturer's instructions and use recommended equipment.
 - c. Quality Control of Welded Seams:
 - 1) Check welded seams for continuity using rounded screwdriver. Make on-site evaluation of welded seams daily at locations directed by Owner's Representative or representative of Roofing Manufacturer.
 - 2) Take one inch wide cross-section samples of welded seams at least three times a day. Patch each test cut at no additional cost to Owner.
- F. Flashings:
- 1. General:
 - a. Install flashings concurrently with roof membrane. No temporary flashings will be allowed without prior written approval of Owner's Representative and Roofing Manufacturer. Approval shall only be for specific locations on specific dates.
 - b. If water is allowed to enter under newly completed roofing, remove and replace affected area no additional cost to Owner.
 - c. Adhere flashings to compatible, dry, smooth, and solvent-resistant surfaces.
 - 2. Membrane Flashings:
 - a. Adhesive Application for Flashings:
 - 1) Adhere flashing membranes to solvent resistant substrates. Cut interior and exterior corners and miters and hot-air weld into place. No bitumen shall be in contact with membrane.
 - 2) Apply adhesive using solvent-resistant 3/4 inch nap paint rollers. Apply adhesive in smooth, even coatings with no holidays, globs, or similar irregularities. Coat only area that can be completely covered in same day's operations. Allow surface with adhesive coating to dry completely prior to installing flashing membrane.
 - 3) When surface is dry, cut flashing membrane to workable length and evenly coat underside with adhesive apply at Manufacturer's adhesive coverage rate requirements.
 - 4) When adhesive has dried sufficiently to produce strings when touched with a dry finger, roll coated membrane onto previously coated substrate being careful to avoid wrinkles. Do not allow adhesive on underside of membrane to completely dry. Overlap adjacent sheets 3 inches. Flashings shall extend 4 inches onto roofing membrane. Press bonded sheet firmly in place with hand roller.
 - 5) Apply no adhesive in seam areas that are to be welded.
 - b. Install fasteners and membrane fastenings plates at 12 inches on center with acceptable fasteners into structural deck at the base of parapets, walls, and curbs. Also install Sarnastop at the base of tapered edge strips and at transitions, peaks, and valleys according to Roofing Manufacturer's details:
 - 1) Hurricane Bar:
 - a) Provide inside four foot perimeter peel stop (Hurricane Bar) required by Owner for all projects in all wind speed coverage areas.
 - c. Extend flashings 8 inches minimum above roofing level unless otherwise accepted in writing by Owner's representative and Roofing Manufacturer.
 - d. Terminate flashings according to Roofing Manufacturer's recommended details.
 - e. Mechanically fasten flashing membranes along top edge through tin discs or pre-drilled, galvanized metal strip washers spaced at of 12 inches maximum on center.
 - 3. Metal Flashings:
 - a. Complete metal work with roofing and flashings so that watertight condition exists daily.
 - b. Install metal to provide adequate resistance to bending and allow for normal thermal expansion and contraction.
 - c. Metal joints shall be watertight.
 - d. Securely fasten metal flashings into solid wood blocking. Fasteners shall penetrate wood nailer one inch minimum.
 - e. Airtight and continuous metal hook strips are required behind metal fascias. Fasten hook strips 12 inches on center into wood nailer or masonry wall.
 - f. Counterflashings shall overlap base flashings 4 inches minimum.
 - g. Metal Base Flashings:
 - 1) Space adjacent sheets 1/4 inch apart.
 - 2) Fasten ends of metal 6 inches on center.
 - 3) Cover joint with 2 inch wide aluminum tape.
 - 4) Hot-air weld 4 inch wide strip of flashing membrane over joint.

- h. Metal Edge Flashing:
 - 1) Install as per requirements of ANSI/SPRI/FM 4435/ES-1, 'Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems'.
 - 2) Fasten metal edge flashings with two rows of post-galvanized flat head annular ring nails, 4 inches on center staggered.
 - 3) Space adjacent sheets of metal 1/4 inch apart.
 - 4) Cover joint with 2 inch wide aluminum tape.
 - 5) Sika Sarnafil Sarnaclad:
 - a) Hot-air weld 4 inch wide strip of flashing membrane over joint.
- G. Temporary Cut-Off:
 - 1. Construct temporary waterstops to provide one hundred (100) percent watertight seal:
 - a. Make stagger of insulation joints even by installing partial panels of insulation.
 - b. Carry new membrane into waterstop.
 - c. Seal waterstop to deck or substrate so water will not travel under new or existing roofing.
 - d. Seal edge of membrane in continuous heavy application of sealant as described above.
 - e. When work resumes, cut-out contaminated membrane and dispose of off-site.
 - 2. If inclement weather occurs while temporary waterstop is in place, provide labor necessary to monitor situation to maintain watertight condition.
 - 3. If water is allowed to enter under newly completed roofing, remove affected area and replace at no additional cost to Owner.
- H. Walkway Rolls:
 - 1. Mark lines on membrane to determine location and direction(s) of walkway network. Membrane surface shall be clean.
 - 2. Follow Manufacturer's written application instructions including adhesive coverage rate requirements.

3.5 FIELD QUALITY CONTROL

- A. Field Inspection:
 - 1. Before Manufacturer's inspection for warranty, Installer must perform pre-inspection to review work and to verify flashing has been completed as well as application of caulking.
 - 2. Final Roof Inspection:
 - a. Arrange for Roofing Membrane Manufacturer's technical personnel to inspect roofing installation on completion.
 - 3. Upon completion of roof inspection, provide certification that installation has been performed in accordance with Contract Document and Roofing Manufacturer requirements.
- B. Non-Conforming Work:
 - 1. Correct all work not in compliance to Contract Documents at no additional cost to Owner.
 - a. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
 - b. Replace contaminated membrane.
 - 2. Additional inspections will be performed to determine compliance of replaced or additional work with specified requirements at no additional cost to Owner.
 - 3. Repair landscaped areas damaged by construction activities at no additional cost to Owner.

3.6 CLEANING

- A. Waste Management:
 - 1. Perform daily clean-up to collect wrappings, empty container, paper, and other roofing waste debris from project site.
 - 2. Upon completion, roofing waste materials must be disposed from site to dumping area legally authorized to receive such materials.
 - 3. Complete site cleanup, including both interior and exterior building areas that have been affected by construction, to Owner's satisfaction.

3.7 PROTECTION

- A. General Contractor Responsibility:
 - 1. Protection of roofing membrane from damage and wear from other trades from damage after completion of roof membrane.
 - 2. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by Manufacturer of affected construction.

END OF SECTION

SECTION 07 6210
GALVANIZED STEEL FLASHING AND TRIM

PART 1 - GENERAL**1.1 SUMMARY**

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

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Type Two Acceptable Manufacturers Of Metal:
 - a. CMG – Coated Metals Group, Denver, CO www.cmgmetals.com.
 - b. Drexel Metals, LLC, Ivyland, PA www.drexmet.com.
 - c. Fabral, Lancaster, PA www.fabral.com.
 - d. Firestone Metal Products, Anoka, MN www.unaclad.com.
 - e. MBCI, Houston, TX www.mbc.com.
 - f. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtsales.com.
 - g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
 - h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
 - i. Ryerson, Chicago, IL www.ryerson.com.
 - j. Equal as approved by Architect before installation. See Section 01 6200.
- B. Materials:
 - 1. Sheet Metal:
 - a. Galvanized iron or steel meeting requirements of ASTM A653/A653M, G 90 or Galvalume steel meeting requirements of ASTM A792/A792M AZ50, 50 ksi.
 - 1) 16 ga for metal protective cover.
 - 2) 22 ga for hold-down clips.
 - 3) 24 ga for all other.
- C. Fabrication:
 - 1. Form accurately to details.
 - 2. Profiles, bends, and intersections shall be even and true to line.
 - 3. Fold exposed edges 1/2 inch to provide stiffness.
- D. Finish:
 - 1. Exposed to view:
 - a. Provide face coating of polyvinylidene Fluoride (PVF₂) Resin-base finish (Kynar 500 or Hylar 5000) containing seventy (70) percent minimum PVF₂ in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
 - b. Reverse side coating shall be thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.
 - 2. Color as selected by Architect from Manufacturer's standard colors.

2.2 ACCESSORIES

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

PART 3 - EXECUTION**3.1 INSTALLATION**

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

3.2 CLEANING

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

END OF SECTION

SECTION 07 6240
ALUMINUM FLASHING AND TRIM

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install aluminum flashing, counterflashing, and hold-down clips as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 06 1100: 'Wood Framing' for wood base.
 - 2. Sections under 07 5000 heading: 'Membrane Roofing' for installation of scuppers, and miscellaneous roofing related flashing.
 - 3. Section 07 9213: 'Elastomeric Joint Sealant'.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Type Two Acceptable Manufacturers Of Metal:
 - a. ATAS International, Inc., Allentown PA www.ATAS.com.
 - b. Fabral, Lancaster, PA www.fabral.com.
 - c. Firestone Metal Products, Anoka, MN www.unaclad.com.
 - d. MBCI, Houston, TX www.mbc.com.
 - e. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
 - f. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
 - g. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
 - h. Ryerson, Chicago, IL www.ryerson.com.
 - i. Equal as approved by Architect before installation. See Section 01 6200.
- B. Materials:
 - 1. Sheet Aluminum:
 - a. 3105-H25 alloy.
 - 1) Flashing And Counterflashing: 0.040 inch thick minimum.
 - 2) Hold-Down Clips: 0.050 inch thick minimum.
 - 3) Parapet Caps:
 - a) 0.050 inch thick.
 - b) Embossed texture.
 - b. Finish:
 - 1) Unexposed: Mill finish.
 - 2) Exposed To View:
 - a) Face coating of polyvinylidene Fluoride (PVF₂) Resin-base finish (Kynar 500 or Hylar 5000) containing 70 percent minimum PVF₂ in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
 - b) Color as selected by Architect from Manufacturer's standard colors.
- C. Fabrication:
 - 1. Form accurately to details.
 - 2. Profiles, bends, and intersections shall be even and true to line.
 - 3. Fold exposed edges 1/2 inch to provide stiffness.

2.2 ACCESSORIES

- A. Screws, Bolts, Nails, And Accessory Fasteners: Of strength and type consistent with function.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Slope to provide positive drainage.
- B. Provide sufficient hold down clips to insure true alignment and security against wind.
- C. Install with 4 inch minimum overlap.
- D. Bed overlap joints in appropriate sealant specified in Section 07 9213.
- E. Form and lap step flashings.
- F. Allow sufficient tolerance for expansion and contraction.
- G. Insulate work to prevent electrolytic action.

3.2 CLEANING

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

END OF SECTION

**SECTION 07 6311
METAL SOFFIT PANELS**

PART 1 - GENERAL**1.1 SUMMARY**

A. Includes But Not Limited To:

1. Furnish and install metal soffit panel system as described in Contract Documents.

1.2 SUBMITTALS

A. Action Submittals:

1. Product Data:

- a. Manufacturer's literature or cut sheet for products furnished.

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.

1.3 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Fire Characteristics Performance Requirement:

- a. Meet requirements of ASTM E84 Class A fire rating.

B. Qualifications:

1. Installer:

- a. Minimum three (3) years experience with installations of comparable quality, scope, similar size, and complexity before bidding.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Materials shall be delivered in original, unopened packages with labels intact.
2. Inspect delivered material for damage.

B. Storage And Handling Requirements:

1. Stack panels on pallets or above ground, covered with weathertight and ventilated covering. Prevent condensation build-up or moisture entrapment in materials.
2. Store panels not in contact with other materials that might cause staining, denting or other surface damage.

1.5 WARRANTY

A. Manufacturer Warranty:

1. Manufacturer's standard warranty against manufacturer defects.
2. Manufacturer's written thirty five (35) year warranty on paint finish against cracking, peeling, blistering, chalk, and color change.

PART 2 - PRODUCTS**2.1 SYSTEMS**

A. Manufacturers:

1. Type One Acceptable Manufacturers Of Metal:

- a. AEP / Span, Dallas, TX www.aep-span.com.
 - b. ATAS Aluminum Products, Allentown, PA www.atas.com.
 - c. Fabral, Lancaster, PA www.fabral.com.
 - d. Fashion Inc, Ottawa, KS www.fashioninc.com.
 - e. Firestone Metal Products, Anoka, MN www.unaclad.com.
 - f. MBCI, Houston, TX www.mbc.com.
 - g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
 - h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
 - i. Ryerson, Chicago, IL www.ryerson.com.
 - j. Equal as approved by Architect before bidding. See Section 01 6200.

B. Performance:

1. Design Criteria:

- a. Flush panel design.

- 1) Panels shall be interlocked full length of panel.

- 2) Panel widths shall be Manufacturer's standard.

- b. Performance Standard: ATAS Wind-LOK Soffit MPS120.

C. Materials:

1. 0.032 inch thick minimum 3105-H24 alloy aluminum meeting requirements of ASTM B209.
2. 24 ga (0.0276 in) galvanized iron or steel meeting requirements of A653/A653M, G 90.

3. 24 ga (0.0276 in) minimum 50 ksi galvalume steel meeting requirements of ASTM A792/A792M AZ-55.

D. Fabrication:

1. Panels shall be uniformly dimensioned, roll formed to lengths to avoid trimming.
2. Panel system shall be anchored as recommended by Manufacturer.
3. Panels shall be continuous.

E. Finish:

1. Polyvinylidene Fluoride (PVF₂) Resin-base (Kynar 500 or Hylar 5000) finish for coil coating components containing 70 percent minimum PVF₂ in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
2. Color as selected by Architect from Manufacturer's standard colors.

2.2 ACCESSORIES

- A. Fastening Devices: 1-1/2 inch cadmium or zinc plated ring shanked nails.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

1. Examine substrate and verify framing is suitable for installation of soffit system.
2. Notify Architect of unsuitable conditions in writing.
 - a. Do not install soffit over unsuitable conditions.
 - b. Commencement of Work by installer is considered acceptance of substrate.

3.2 INSTALLATION

- A. Conceal fasteners where possible. Paint heads of exposed fasteners to match background.
- B. Isolate from dissimilar metals to prevent electrolytic action.

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 including buckling or bowing due to improper installation and touch up of minor scratches and spots at no additional cost to the Owner.

3.4 CLEANING

A. General:

1. Clean exposed panel surfaces promptly after installation in accordance with manufacturer's instructions.

B. Waste Management:

1. Dispose of waste in provided waste receptacles (dumpsters) as specified in Section 01 7400.

END OF SECTION

**SECTION 07 6321
ALUMINUM FASCIA****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install aluminum fascia as described in Contract Documents.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Fire Characteristics Performance Requirement:
 - a. Meet requirements of ASTM E84 Class A fire rating.
- B. Qualifications:
 - 1. Installer:
 - a. Minimum three (3) years' experience with installations of comparable quality, scope, similar size, and complexity before bidding.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Materials shall be delivered in original, unopened packages with labels intact.
 - 2. Inspect delivered material for damage.
- B. Storage And Handling Requirements:
 - 1. Stack panels on pallets or above ground, covered with weathertight and ventilated covering. Prevent condensation build-up or moisture entrapment in materials.
 - 2. Store panels not in contact with other materials that might cause staining, denting or other surface damage.

1.5 WARRANTY

- A. Manufacturer Warranty:
 - 1. Manufacturer's standard warranty against manufacturer defects.
 - 2. Manufacturer's written thirty five (35) year warranty on paint finish against cracking, peeling, blistering, chalk, and color change.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Type One Acceptable Manufacturers Of Metal:
 - a. AEP / Span, Dallas, TX www.aep-span.com.
 - b. ATAS Aluminum Products, Allentown, PA www.atas.com.
 - c. Fabral, Lancaster, PA www.fabral.com.
 - d. Firestone Metal Products, Anoka, MN www.unaclad.com.
 - e. Hunter-Douglas Ltd, Brampton, ON www.hunterdouglas.com.
 - f. Jenisys Engineered Products, Goodlettsville, TN www.jenisysep.com.
 - g. Kaycan Ltd, Montreal, PQ www.kaycan.com.
 - h. MBCI, Houston, TX www.mbc.com.
 - i. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
 - j. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
 - k. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
 - l. Ryerson, Chicago, IL www.ryerson.com.
 - m. VicWest, Oakville, ON www.vicwest.ca.
 - n. Equal as approved by Architect before bidding. See Section 01 6200.

- B. Materials:
 - 1. Aluminum: 0.032 inch thick minimum embossed "stippled" texture, complete with accessories recommended by Manufacturer for proper installation.
- C. Finishes:
 - 1. Face coating polyvinylidene Fluoride (PVF₂) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing 70 percent minimum PVF₂ in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
 - 2. Color as selected by Architect from Manufacturer's standard colors.
- D. Fabrication: Fascia may either be shop-fabricated using metal from a specified manufacturer, or a factory-fabricated standard system from a specified manufacturer.

2.2 ACCESSORIES

- A. Fastening Devices: One inch zinc or cadmium plated screws.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
 - 1. Examine substrate and verify framing is suitable for installation of fascia.
 - 2. Notify Architect of unsuitable conditions in writing.
 - a. Do not install fascia over unsuitable conditions.
 - b. Commencement of Work by installer is considered acceptance of substrate.

3.2 INSTALLATION

- A. Conceal fasteners except where details might require a minimum number to be exposed. Paint heads of exposed fasteners to match background.
- B. Install with slip joints at each end. Screw to substrate through pre-drilled, over-size holes.
- C. Isolate from dissimilar metals not part of fascia system to prevent electrolytic action.

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 including buckling or bowing due to improper installation and touch up of minor scratches and spots at no additional cost to the Owner.

3.4 CLEANING

- A. General:
 - 1. Clean exposed panel surfaces promptly after installation in accordance with manufacturer's instructions.
- B. Waste Management:
 - 1. Dispose of waste in provided waste receptacles (dumpsters) as specified in Section 01 7400.

END OF SECTION

SECTION 07 9213
ELASTOMERIC JOINT SEALANTS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install sealants not specified to be furnished and installed under other Sections.
 - 2. Quality of sealants to be used on Project not specified elsewhere, including submittal, material, and installation requirements.
- B. Related Requirements:
 - 1. Furnishing and installing of sealants is specified in Sections specifying work to receive new sealants.
- C. Products Furnished But not Installed Under This Section:
 - 1. Interior Ceramic Tile Joint Sealants:
- D. Related Requirements:
 - 1. Section 09 3013: 'Ceramic Tiling'.

1.2 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.

1.3 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.

1.4 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.

1.5 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 or subjected to sustained temperatures exceeding 90 deg F or as per Manufacturer's written recommendations
4. Do not use sealants that have exceeded shelf life of product.

1.6 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.

1.7 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.
 - b. Franklin International, Inc. Columbus, OH www.titebond.com.
 - c. GE Sealants & Adhesives (see Momentive Performance Materials Inc.).
 - d. Laticrete International Inc., Bethany, CT www.laticrete.com.
 - e. Momentive Performance Materials Inc. (formally GE Sealants & Adhesives), Huntersville, NC www.ge.com/silicones.
 - f. Sherwin-Williams, Cleveland, OH www.sherwin-williams.com.
 - g. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com.
 - h. Tremco, Beachwood, OH www.tremcosealants.com.

B. Materials:

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

- d) Door frames.
 - e) EIFS to metal joints.
 - f) Joints and cracks around windows.
 - g) Louvers.
 - h) Masonry.
 - i) Parapet caps.
 - j) Wall penetrations.
 - k) Other joints necessary to seal off building from outside air and moisture.
- b. Design Criteria:
- 1) Meet following standards for Sealant:
 - a) ASTM C920: Type S, Grade NS, Class 50 Use NT, M, G, A.
 - 2) Limitations:
 - a) Do not use below-grade applications.
 - b) Do not use on surfaces that are continuously immersed or in contact with water.
 - c) Do not use on wet, damp, frozen or contaminated surfaces.
 - d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
 - 3) Color:
 - a) Architect to select from Manufacturer's standard colors.
 - b) Match building elements instead of window (do not use white that shows dirt easily).
- c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
- 1) Dow Corning:
 - a) Primer: 1200 Prime Coat.
 - b) Sealant: 791 Silicone Weatherproofing Sealant.
 - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
 - a) Primer: SS4044 Primer.
 - b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.
 - 3) Tremco:
 - a) Primer:
 - (1) Metal surface: No. 20 primer.
 - (2) Porous surfaces: No. 23 primer.
 - b) Sealant: Spectrum 1 Silicone Sealant.
3. Sealants At Exterior Sheet Metal And Miscellaneous:
- a. Description:
- 1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
 - a) Flashings.
 - b) Penetrations in soffits and fascias.
 - c) Roof vents and flues.
- b. Design Criteria:
- 1) Meet following standards for Sealant:
 - a) ASTM C920: Type S Grade NS, Class 25 (min) Use NT, M, G, A and O.
 - 2) Limitations:
 - a) Do not use below-grade applications.
 - b) Do not use on surfaces that are continuously immersed or in contact with water.
 - c) Do not use on wet, damp, frozen or contaminated surfaces.
 - d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
- c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
- 1) Dow Corning: 790 Silicone Building Sealant.
 - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2350 Silicone Elastomeric Sealant.
 - 3) Tremco: Tremsil 600 Silicone Sealant.
4. Sealants At Expansion Joints in Exterior Concrete (Aprons, Entryway Slabs, Mowstrips, Retaining Walls, Sidewalks):
- a. Expansion Joints:
- 1) Design Criteria:
 - a) Meet following standards for Sealant:
 - (1) ASTM C920: Type S, Grade NS, Class 100/50 Use T, NT, M, G, A, and O.

- 2) Seal all expansion joints.
- 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 790 Silicone Building Sealant.
 - b) Sika:
 - (1) Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
- b. Penetrations thru Concrete Walls:
 - 1) Design Criteria:
 - a) Meet following standards for Sealant:
 - (1) ASTM C920: Type S, Grade NS, Class 100/50 Use T, NT, M, G, A, and O.
 - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 790 Silicone Building Sealant.
 - b) Sika:
 - (1) Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
5. Sealants At Control Joints in Exterior Concrete (Aprons, Entryway Slabs, Mowstrips, Retaining Walls, Sidewalks):
 - a. Control Joints:
 - 1) Design Criteria:
 - a) Meet following standards for Sealant:
 - (1) ASTM C920, Type S, Grade P, Class 100/50; Use T, M, G, A, O.
 - 2) Sealant required at control joints in following areas:
 - a) Miscellaneous vertical applications.
 - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 890-SL Silicone Building Sealant.
 - b) Sika:
 - (1) Primer: Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 SL Self-leveling Silicone Sealant.
6. Sealants At Exterior CMU Expansion Joints:
 - a. Description:
 - 1) Weathersealing expansion, contraction, and other movement joints CMU:
 - b. Design Criteria:
 - 1) Meet following standards for Sealant:
 - a) ASTM C920: Type S, Grade NS, Class 50 (min.), Use NT, M, , G, M.
 - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Dow Corning:
 - a) Primer: 1200 Prime Coat.
 - b) Sealant: 790 Silicone Building Sealant.
 - c) Color: Precast White.
 - 2) Momentive Performance Materials (formerly (formerly, GE Sealants & Adhesives):
 - a) Primer: SS4044 Primer.
 - b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.
 - c) Color: SCS2020.
 - 3) Sika:
 - a) Primer: Sikasil Primer-2100.
 - b) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
7. General Interior Sealants:
 - a. General:
 - 1) Jambs and heads of exterior door frames.
 - 2) Jamb / Head joint on hollow metal door frames.
 - 3) Both sides of interior door frames.
 - 4) Inside perimeters of windows.
 - 5) Miscellaneous gaps between substrates.

- b. Design Criteria:
 - 1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.
 - 2) 100 percent silicone sealant.
 - c. Non-Paintable Sealant (Installer Option A):
 - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - a) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
 - b) Laticrete: Latasil Silicone Sealant.
 - c) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2800 SilGlaze II Silicone Sealant.
 - d) Sherwin Williams: White Lightning Silicone Ultra Low Odor Window and Door Sealant.
 - e) Tremco: Tremsil 200 Silicone Sealant.
 - f) Franklin International: Titebond 2601 (White) 2611 (Clear) 100% Silicone Sealant.
 - d. Paintable Sealant (Installer Option B):
 - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - a) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS7000 Paintable Silicone Sealant.
8. Sealants For Interior Joints:
- a. General:
 - 1) Countertops and backsplash to wall.
 - 2) Sinks and lavatories to countertops.
 - 3) Joints between plumbing fixtures and other substrates.
 - b. Interior Ceramic Tile Joints are furnished in Section 07 9213 and installed in Section 09 3013 'Ceramic Tiling' including the following:
 - 1) Ceramic tile inside corners.
 - 2) Ceramic tile and paver tile joints.
 - c. Description:
 - 1) One-part acetoxycure silicone sealant with fungicides to resist mold and mildew.
 - d. Design Criteria:
 - 1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.
 - 2) 100 percent silicone sealant.
 - e. Color: As selected by Architect from Manufacturer's standard colors.
 - f. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
 - 2) Laticrete: Latasil Tile and Stone Silicone Sealant.
 - 3) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS1700 Sanitary Silicone Sealant.
 - 4) Tremco: Tremsil 200 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 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. Surfaces shall be clean, dry, free of dust, oil, grease, dew, frost or incompatible sealers, paints or coatings that may interfere with adhesion. Prepare substrates in accordance with Manufacturer's instructions:
 - a. Porous surfaces: Clean by mechanical methods to expose sound surface free of contamination and laitance followed by blasting with oil-free compressed air.
 - b. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193. Allow solvent to evaporate prior to sealant application.
 - c. High-pressure water cleaning: Exercise care that water does not enter through failed joints.
 - d. Primers:
 - 1) Primers enhance adhesion ability.
 - 2) Use of primers is not a substitution for poor joint preparation.
 - 3) Primers should be used always in horizontal application where there is ponding water.
2. 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.
3. 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 contaminants 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.
 - 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 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 minimum and 1/2 inch 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 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 of applied silicone sealant and one (1) test for each 1,000 linear feet seal thereafter or perform one (1) test per floor per building elevation minimum.
 - b. For sealants applied between dissimilar materials, test both sides of joints.
 2. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
 3. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

3.6 CLEANING

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

END OF SECTION

DIVISION 08: OPENINGS

08 0100 OPERATION AND MAINTENANCE OF OPENINGS

08 0601 HARDWARE GROUP AND KEYING SCHEDULES

08 1000 DOORS AND FRAMES

08 1213 HOLLOW METAL FRAMES

08 1429 FLUSH WOOD DOORS: FACTORY-FINISHED, CLEAR

08 4000 ENTRANCES, STOREFRONTS, AND CURTAIN WALLS

08 4113 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

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

08 7913 KEY STORAGE AND CONTROL EQUIPMENT

08 8000 GLAZING

08 8100 GLASS GLAZING

END OF TABLE OF CONTENTS

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SECTION 08 0601
HARDWARE GROUP AND KEYING SCHEDULES

PART 1 - GENERAL**1.1 SUMMARY**

A. Includes But Not Limited To:

1. Furnish and install door hardware and keying as described in Contract Documents.

1.2 REFERENCES

A. Definitions:

1. Builders Hardware Manufacturer's Association (BHMA) Hardware Functions:
 - a. F75 Passage Latch: Latch bolt operated by lever from either side at all times.
 - b. F76 Privacy Lock: Latch bolt operated by lever from either side. Outside lever locked by push button inside, unlocked by emergency key from outside or rotating lever from inside.
 - c. F81 Office Door Lock: Dead locking latch bolt operated by lever from either side, except when outside lever is locked by turn button in inside lever. When outside lever is locked, latch bolt is operated by key in outside lever or by rotating inside lever. Turn button must be manually rotated to unlock outside lever.
 - d. F84 Classroom Deadlock: Dead locking latch bolt operated by lever from either side, except when outside lever is locked, latch bolt is operated by key in outside lever or by rotating inside lever.
 - e. F86 Utility Space Door Lock: Dead locking latch bolt operated by key in outside lever or by rotating inside lever. Outside lever is always fixed.
 - f. F91 Store Door Lock: Deadlocking latch operated by either lever. Key in either lever locks / unlocks both levers.
 - g. F109 Entrance Lock: Turn/push button locking: Pushing and turning button disengages outside lever, requiring using of key until button is manually unlocked. Push-button locking: Pushing button disengages outside lever until unlocked by key or by turning inside lever. Disengages outside spindle from latch when locked.
 - h. E2142 Deadbolt: Dead bolt operated by key from either side. Bolt automatically dead locks when fully thrown.
 - i. E2152 Deadbolt: Dead bolt operated by key from outside and turn unit from inside. Bolt automatically dead locks when fully thrown.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Materials shall be delivered in original, unopened packages with labels intact.

PART 2 - HARDWARE GROUPS**2.1 STOREFRONT ENTRY DOORS**

A. Single Doors:

1. **Group ST1:**
 - a. 1 set: Continuous Geared Hinge.
 - b. 1 set: Weatherstrip.
 - c. 1 each: Closer.
 - d. 1 each: Exit Device with dogging capability and locking cylinder.
 - e. 1 each: Pull.
 - f. 1 each: Stop.
 - g. 1 each: Sweepstrip.
 - h. 1 each: Threshold.

2.2 INTERIOR DOORS

A. Single Interior Doors:

1. **Group 20A: (Break Room)**
 - a. 1 set: Smoke Gaskets.
 - b. 3 each: Hinges.
 - c. 1 each: Latchset Function F75.
 - d. 1 each: Stop (wall).
 - e. 1 each: Threshold (where indicated on Drawings).

2. **Group 24A:** (Storage/Custodian)
 - a. 1 set: Smoke Gaskets.
 - b. 3 each: Hinges.
 - c. 1 each: Lockset Function F81.
 - d. 1 each: Stop.
 - e. 1 each: Threshold where indicated on Contract Documents.
3. **Group 26:** (Offices & To Existing Building)
 - a. 1 set: Smoke Gaskets.
 - b. 1 each: Acoustic Seal.
 - c. 3 each: Hinges.
 - d. 1 each: Lockset Function F81.
 - e. 1 each: Stop.
 - f. 1 each: Threshold.
4. **Group 28F:** (Restrooms)
 - a. 1 set: Smoke Gaskets.
 - b. 1 each: Closer.
 - c. 3 each: Hinges.
 - d. 1 each: Pull.
 - e. 1 each: Push.
 - f. 1 each: Kick Plate.
 - g. 1 each: Stop.
 - h. 1 each: Threshold where indicated on Contract Drawings.

PART 3 - KEYING SCHEDULE for FINISH HARDWARE

3.1 KEYING SCHEDULE

- A. Keying Schedules:
 1. Deseret Industries Keying Schedule:
 - a. Provided by Owner. Contact Deseret Industries Division Facilities.

END OF SECTION

**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.
 - 2. Section 08 4113: 'Aluminum-Framed Entrances And Storefronts' for aluminum entry frames.

1.2 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:
 - 1) Contact Information: Russ Farley: phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.
 - b. Beacon Metals Inc, Salt Lake City, UT 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.
- 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. All Frames: 14 gauge.
 - 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 minimum meeting UL or other code acceptable requirements for door rating involved.
- D. Fabrication:
 - 1. General Requirements:
 - a. Frames shall be welded units. Provide temporary spreader on each welded frame.
 - b. Provide Manufacturer's gauge label for each item.
 - c. Make breaks, arrises, and angles uniform, straight, and true. Accurately fit corners.
 - 2. Frame width dimension:
 - a. Fabricate frame 1/8 inch wider than finished wall thickness as described in Contract Documents.
 - 3. Provide mortar guards at strikes and hinges.
 - 4. Anchors:
 - a. Provide four 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. Install one at 2 inches above floor. Tack weld anchors on frames intended for installation in framed walls.
 - b. Frames installed before walls are constructed shall be provided with extended base anchors in addition to other specified anchors.
 - c. Anchor types and configurations shall meet wall conditions.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 08 1429
FLUSH WOOD DOORS: Factory-Finished, Clear

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 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) Approval subject to Annual Review:
 - a) Prepare sample to match Control Sample available from Owner to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
 - b) Approval of sample by Owner will establish performance standard of stain to be used until next annual review.
 - 2) Design Criteria:
 - a) Provide 8 inch by 10 inch sample of Red Oak to match stain Control Sample provided by Owner.
- B. Informational Submittals:
 - 1. Source Quality Control Submittals:
 - a. Samples:
 - 1) Interior Hardwood for Transparent Finish:
 - a) Owner will provide Control Sample 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.

1.3 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.

1.4 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 or more in door panel at time of one-year warranty inspection.
 - 3) Telegraphing of core assembly: Variation of 1/100 inch or more in 3 inch 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:
 - 1) Contact Information: Russ Farley: phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.
 - b. Beacon Metals Inc, Salt Lake City, UT 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.
- 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 thick minimum immediately before finishing.
 - b. Face veneers shall be running book matched.
 - 5. Core:
 - a. Fully bonded to stiles and rails and sanded as a unit before applying veneers.
 - b. Non-Rated:
 - 1) 32 lb density meeting requirements of ANSI A208.1 Mat Formed Wood Particle Board, Grade 1-L-1 minimum.
 - 2) Stiles:
 - a) 1-3/8 inches 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.
 - b) Manufacturer's option.
 - 6. Factory Glazing:
 - a. Glazing (non-fire-rated openings): Tempered glazing meeting requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality q3. Thickness 1/4 inch.
 - b. Lite Kit:
 - 1) Design Criteria:
 - a) Pre-finished wood or wood veneer frames.
 - 2) Dimensions:
 - a) Doors shown on Door Schedule are to have 6 inch wide by 33 inches high cutout opening) security view window with bottom of opening located 42 inches above finish floor and side located 6 inches from strike edge of door.
 - 3) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - a) Profile M6G by Graham.
 - b) Profile W6 by Marshfield.
 - c) Profile VT1 by VT Industries.
- 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. Color:
 - 1) LDS 110.
- 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 4113
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install aluminum storefront entry and window systems, including hardware, glazing, and caulking, as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 06 2024: 'Door, Frame, And Hardware Installation' for installation of locking cylinders.
 - 2. Section 07 9213: 'Elastomeric Joint Sealant' for quality of sealants.
 - 3. Section 08 7103: 'Securing Devices' for furnishing of locking cylinders.
 - 4. Section 08 8100: 'Glass Glazing' for quality of glass glazing.
 - 5. Division 26: 'Electrical' for power Source.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in pre-installation conference for storefront entrance sections.
 - 2. Schedule conference one (1) week before scheduled installation of storefront system.
 - 3. Participate in pre-installation conference held jointly with following sections:
 - 4. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review installation scheduling, coordination, placement of storefront entrances.
 - b. Review location of signage on entrance doors.
 - c. Review delivery, storage, and handling requirements.
 - d. Review safety issues.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature or cut sheets.
 - b. Color and finish selections.
 - 2. Shop Drawings:
 - a. Show locations, sizes, etc, of hardware reinforcing.
 - b. Show wind loads and engineering for Project conditions.
 - c. Clearly mark components to identify their location in Project.
- B. Informational Submittals:
 - 1. Qualification Statement:
 - a. Installer:
 - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Maintenance, adjustment, and repair instructions.
 - b. Warranty Documentation:
 - 1) Final, executed copy of Warranty.
 - a) Storefront warranty.
 - b) Storefront closers.
 - c. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature or cut sheets for storefront system and for each item of hardware.
 - b) Color and finish selections.
 - c) Parts lists.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Storefront System Performance Requirements:
 - a. Provide test reports from AAMA accredited laboratories certifying performances if requested:
 - 1) Air Leakage: Meet requirements of ASTM E283.
 - 2) Limit air leakage through assembly to 0.06 CFM/min/sq ft of wall area at 6.24 PSF as measured in accordance with ASTM E283.
 - 3) Water Resistance: No water leakage when measured in accordance with ASTM E331 with static test pressure of 8PSF as defined by AAMA 501.

- 4) Dynamic Water Resistance: No water leakage, when measured in accordance with AAMA 501 with dynamic test pressure of 8 PSF .
- 5) Limit mullion wind load deflection of L/175 with full recovery of glazing materials, when measured in accordance with ASTM E330/E330M.
- 6) System shall not deflect more than 1/8 inch at center point, or 1/16 inch at enter point of horizontal member, once dead load points have been established.
- 7) System shall accommodate expansion and contraction movement due to surface temperature differential of 180 deg F.
- 8) Seismic testing shall conform to AAMA recommended static test method for evaluating performance of curtain walls and storefront wall systems due to horizontal displacements associated with seismic movements and building sway.
2. Provide wind load and impact testing by testing laboratory when required by local codes and jurisdictions.
 - a. See Section 01 4523 for Testing and Inspection administrative requirements and responsibilities for Testing Agencies and Section 01 4301 for Testing Agency Qualifications.
- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
 1. Manufacturer Qualifications:
 - a. Provide aluminum entrances and storefront systems produced by a firm experienced in manufacturing systems that are similar to those indicated for this project and that have a record of successful in service performance.
 2. Fabricator Qualifications:
 - a. Provide aluminum entrances and storefront systems fabricated by a firm experienced in producing systems that are similar to those indicated for this Project, and that have a record of successful in service performance.
 - b. Fabricator shall have sufficient production capacity to produce components required without causing delay in progress of the Work.
 3. Installer Qualifications:
 - a. Minimum three (3) years experience in storefront installations.
 - b. Minimum five (5) satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
 - c. Upon request, submit documentation.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 1. Deliver all parts of door, together with hardware, in original, unopened packages with labels intact to Project at same time.
- B. Storage And Handling Requirements:
 1. Store in clean, dry location, indoors in Manufacturer's unopened packaging until ready for installation and in accordance with Manufacturer's instructions.
 2. Stack framing components in a manner that will prevent bending and avoid significant or permanent damage.
 3. Protect materials and finish from damage during storage, handling and installation.

1.6 WARRANTY

- A. Manufacturer Warranty:
 1. Door Construction:
 - a. Lifetime warranty for normal use.
 - 1) Warranty does not include door installation, attached hardware and finish.
 2. Closers:
 - a. Closer Manufacturer's standard warranty, 10 years minimum.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

- A. Manufacturers:
 1. Category One VMR Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Arcadia Inc., Vernon CA www.arcadiainc.com.
 - 1) Contact Information: Ken Martinek, (602) 734-5327 kmartinek@arcadiainc.com.
 - b. Kawneer North America, Norcross, GA, www.kawneer.com/kawneer/north_america.
 - 1) Contact Information: Bart Daniels cell (385) 214-4650 bart.daniels@alcoa.com.
- B. General:
 1. In addition to requirements shown or specified, comply with:
 - a. Applicable provisions of AAMA SFM 1, 'Aluminum Store Front and Entrance Manual' for design, materials, fabrication and installation of component parts.

- C. Design Criteria:
 - 1. Storefront System suitable for outside or inside glazing.
- D. Materials:
 - 1. Framing Components and Accessories:
 - a. Aluminum Extrusions:
 - 1) 6063-T6 aluminum alloy or meet requirements of ASTM B221, alloy GS 10a T6.
 - 2) Anchors, Clips, and Accessories:
 - a) Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated (properly isolated steel from aluminum).
 - 3) Fasteners:
 - a) Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.
 - 4) Glazing Gasket:
 - a) Compression-type design with replaceable extruded EPDM rubber.
 - 5) Reinforcing Members:
 - a) Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
 - 6) Sidelites:
 - a) Sills: Match height of door bottoms
 - b) Heads: Match height of door heads.
 - 7) Sealant:
 - a) Structural Sealant meeting requirements of ASTM C1184 for fabrication within storefront system:
 - (1) Permanently elastic, non-shrinking, and non-migrating type for joint size and movement.
 - (2) Single-component neutral-curing silicone formulation compatible with system components specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in aluminum-framed systems indicated.
 - (3) Color: Black.
 - b) Joint Sealants used at perimeter of storefront framing system: Elastomeric Sealant as specified in Section 07 9213.
 - c) Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when required by local codes or AHJ.
 - 8) Tolerances:
 - a) Tolerances for wall thickness and other cross-sectional dimensions of storefront members in compliance with AA Aluminum Standards and Data.
 - b. Storefront Framing System:
 - 1) Brackets and Reinforcements:
 - a) Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
 - 2) Fasteners and Accessories:
 - a) Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
 - 3) Perimeter Anchors:
 - a) When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
 - c. Finish:
 - 1) Match doors.
 - d. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Non-Thermal, 2 inch Sightline:
 - a) Single Glazed:
 - (1) AR450 by Arcadia.
 - (2) Trifab VG 450 by Kawneer.

- b) Double Glazed:
 - (1) AG451 by Arcadia.
 - (2) Trifab VG 451 by Kawneer.
- 2. Manually Operated Doors:
 - a. Aluminum: 6063 T6 aluminum alloy, or meeting requirements of ASTM B221, alloy GS 10a T6.
 - b. Stiles:
 - 1) 3-1/2 inches by 1-3/4 inches by 0.125 inches thick nominal.
 - c. Top Rails:
 - 1) 6 inches by 1-3/4 inches by 0.125 inches (89 mm by 45 mm by 3.175 mm) thick nominal.
 - d. Bottom Rail:
 - 1) 10 inches minimum by 1-3/4 inches by 0.125 inches thick nominal.
 - e. Construction:
 - 1) Manufacturer's standard.
 - f. Glazing Stops:
 - 1) Snap-in type with neoprene bulb-type glazing.
 - 2) Units shall be glazed from exterior side.
 - g. Weatherstripping:
 - 1) Neoprene bulb-type.
 - 2) Approved Products:
 - a) Peri-Plus Seal (PPS) by Arcadia.
 - b) Kawneer Sealair.
 - h. Factory Finishing:
 - 1) Clear Anodized Aluminum Finish:
 - a) Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish etched, medium matte; clear coating 0.40 mils (0.01016 mm) to 0.70 mils (0.01778 mm) thick) complying with AAMA 611.
 - i. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Non-Thermal:
 - a) MS362 Medium Stile by Arcadia.
 - b) 350 Medium Stile by Kawneer.
- 3. Glazing:
 - a. Glazing as specified in Section 08 8100: 'Glass Glazing'.
 - b. Glazing Gaskets:
 - 1) Compression-type design with replaceable extruded EPDM rubber.
 - c. Spacers and Setting Blocks: Elastomeric.
 - d. Bond-Breaker (Sealer) Tape: Standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
 - e. Glazing Sealant:
 - 1) Structural Sealant meeting requirements of ASTM C1184:
 - a) Permanently elastic, non-shrinking, and non-migrating type for joint size and movement.
 - b) Single-component neutral-curing silicone formulation compatible with system components specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in aluminum-framed systems indicated.
 - c) Color: Black.
 - 2) Weather Sealant:
 - a) ASTM C920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weather seal sealant, and aluminum-framed-system manufacturers for this use.
 - b) Color: Match structural sealant.
- 4. Hardware:
 - a. Manually Operated Doors:
 - 1) Hinging:
 - a) Full height geared hinge with continuous cover

- 2) Overhead Door Closers:
 - a) Provide parallel arms on closers unless door position requires otherwise.
 - b) Closers shall allow for 180 degree opening and not be used as stop.
 - c) Provide Spring-Cush, Spring-H-Cush, or equivalent arm where indicated on door schedule.
 - d) Adjust closers to provide maximum opening force as required by governing code authority.
 - e) Closers shall have following features:
 - (1) Adjustable sweep speed.
 - (2) Adjustable backcheck.
 - (3) Non-handed, non-sized.
 - f) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Surface mounted.
 - (2) 4041 Series parallel arm by LCN.
 - (3) 7700 Series Parallel arm by Norton.
- 3) Deadbolts:
 - a) Thumbturn on Processing Room side, keyed on Office area side.
 - b) Approved Products: Match manufacturer of locksets provided under Section 08 7103.
- 4) Exit Devices:
 - a) Operation:
 - (1) Entry shall be by key. Device shall be locked by cylinder from outside. Key shall be removable when cylinder is in locked or unlocked position.
 - (2) Dogging operation shall be by accessible, permanent knob, not by removable allen wrench devices.
 - (3) Color: Equivalent to clear anodized.
 - (4) Exterior Trim: Pull equal to Kawneer CO-9 or Arcadia OPR-9.
 - b) Types:
 - (1) Double Doors Without Mullions: Concealed vertical rods, three point locking on Doors 101B and 102B.
 - (2) All Other Doors: Rim Type. Provide type of strike that will allow installation of specified panic devices on storefront system specified.
 - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Apex Series by Precision.
 - (2) 80 Series by Sargent.
 - (3) 98 or 99 Rim Series by Von Duprin.
- 5) Low-Energy Swing Door Operator:
 - a) Meet requirements of ICC/ANSI 117.1 and ANSI/BHMA A156.19.
 - b) Wall-mounted push button operation.
 - c) Solid state electronic control.
 - d) Adjustable closing speed and hold-open range.
 - e) Automatic and manual operating modes.
 - f) Metal cover finished to match door.
 - g) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - I. Besam SW100 by Besam (subsidiary of ASSA ABLOY) US-Monroe, NC www.besam.us.
 - II. Horton Series 7100 Low Energy by Horton Automatics (Division of Overhead Door Corp.), Corpus Christi, TX www.hortondoors.com.
 - III. Record 6100 Series Low Energy Swing Door Operator by Record-USA, Monroe, NC www.record-usa.com.
 - IV. Stanley Magic-Force by Stanley Access Technologies, Farmington, CT www.stanleyaccesstechnologies.com.
- 6) Thresholds:
 - a) Design Criteria: Meet handicap accessibility requirements.
 - b) All Others: Manufacturer's standard.
- 7) Sweep Strips:
 - a) Entrance Manufacturer's standard (cover cap with no exposed fasteners).

- 8) Push / Pulls:
 - a) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) PBR and OPR-9 by Arcadia.
 - (2) Kawneer CP and CO-9, clear anodized.
- E. Fabrication:
 - 1. Construction shall meet Manufacturer's recommendations.
 - 2. Fabricate components that, when assembled, have following characteristics:
 - a. Profiles sharp, straight, and free of defects or deformations.
 - b. Accurately fit joints; make joints flush, hairline and weatherproof.
 - c. Means to drain water passing joints, condensation within framing members, and moisture migrating within system to exterior.
 - d. Physical and thermal isolation of glazing from framing members.
 - e. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - f. Provisions for field replacement of glazing.
 - g. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 - h. Framing members shall be internally reinforced and secured at head and sill as necessary for structural performance requirements and for hardware attachment.
 - 3. Fabricate in factory to dimensions required to fit framed openings detailed on Contract Documents. Joints shall be tightly closed.
 - 4. Mortise in manner to give maximum hardware-door connection strength and neatness of appearance. Adequately reinforce with back plates or rivnuts to hold pivots and closers.
 - 5. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
 - 6. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
 - 7. Storefront Framing: Fabricate components for assembly using manufactures standard installation instructions.
 - 8. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

PART 3 - EXECUTION

3.1 INSTALLERS

- A. Performance Standard Installers: See Section 01 6200 for definitions of Categories. See Section 01 4301 and 'Quality Assurance' in Part 1 'General' for Installer Qualifications of this specification:
 - 1. General Contractor responsible for Installer(s), verification of qualifications, and performance. Contact VMR Approved Manufacturer's Representative specified in Part 2 'Products' of this specification for potential installers if desired.

3.2 EXAMINATION

- A. Verification Of Conditions:
 - 1. Verify that framed openings comply with Contract Document requirements.
 - 2. Verify floor is level across entire width of automatic door opening.
 - 3. Verify sill conditions are level and/or sloped away from openings as specified.
 - 4. Verify wall framing is dry, clean, sound, and free of voids and offsets, construction debris, sharp edges or anything that will prevent a successful installation of storefront system.
 - 5. Notify Architect in writing if framed openings are incorrect.
 - a. Do not install storefront entry and window frames until deficiencies in framed openings have been corrected.
 - b. Commencement of Work by installer is considered acceptance of substrate.

3.3 INSTALLATION

- A. General:
 - 1. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
 - 2. All installation shall be in accordance with manufacturer's published recommendations and in accordance with approved shop drawings.
 - 3. Do not install damaged components. Fit frame joints tight, free of burrs and distortion. Rigidly secure non-movement joints.
 - 4. Isolate metal surfaces in contact with incompatible metal or corrosive substrates, including wood, by applying sealer tape to prevent electrolytic action.

- B. Set plumb, square, level, and in correct alignment and securely anchor to following tolerances:
 - 1. Variation from plane: Limit to 1/8 inch in 12 feet ; 1/4 inch over total length.
 - 2. Offset from Alignment: For surfaces abutting in line, limit offset to 1/16 inch.
 - 3. Offset at Corners: For surfaces meeting at corner, limit offset to 1/32 inch.
 - 4. Diagonal measurements: Limit difference between diagonal measurements to 1/8 inch.
 - 5. Sidelights: Line up horizontal rail in sidelight with door rail.
- C. Install doors without warp or rack. Adjust doors and hardware to provide 90 degree operation, tight fit at contact points and smooth operation.
- D. Install exterior window units with through wall sill flashing.
- E. Thresholds:
 - 1. Accurately cut thresholds to fit profile of storefront frame. Bed exterior thresholds in specified sealant at contact points with floor and make watertight.
- F. Sealants:
 - 1. Apply in accordance with Section 07 9213 'Elastomeric Joint Sealant' requirements.
 - 2. Caulk joints between frames and walls, both interior and exterior to provide weather tight installation.
- G. Glazing Characteristics:
 - 1. Exterior Doors And Storefront:
 - a. Clear interior pane and Clear exterior pane with Low E treatment on surface 2.
 - 2. Interior Doors And Vestibules:
 - a. Clear.
- H. Signage:
 - 1. Exterior Doors And Storefront:
 - a. Provide signage on door glazing of automatic doors to designate ENTRANCE.
 - 2. Interior Doors And Vestibules:
 - a. Provide signage on door glazing of automatic doors to designate EXIT.

3.4 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
 - 1. Pull test swinging doors to ensure security of openings.
 - 2. Make all necessary final adjustments to attain normal operation of each door and its mechanical hardware.
- 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 including removal and replacement of glass that has been broken, chipped, cracked, abraded, or damaged during construction period at no additional cost to the Owner.
 - 2. Frames that have been dented, scratched or have other damage will result in replacement, not repair.

3.5 ADJUSTING

- A. Adjust doors for proper operation after glazing entry. After repeated operation of completed installation, re-adjust door for optimum operating condition and safety if required.

3.6 PROTECTION

- A. During Installation:
 - 1. Installer's Responsibility:
 - a. During installation, all adjacent work shall be protected from damage.
- B. After Installation:
 - 1. General Contractor's Responsibility:
 - a. Institute protective measures required throughout remainder of construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

3.7 CLEANING

- A. General:
 - 1. Installer's Responsibility:
 - a. Follow Manufacturer's written recommendations for cleaning and maintenance or guidelines of AAMA 609 & 610 'Cleaning and Maintenance Guide for Architecturally Finished Aluminum' (combined documents). Avoid damaging protective coatings and finishes.
 - b. Clean glass and aluminum surfaces, inside and out, promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Exercise care to avoid damage to coatings.

- c. Remove nonpermanent labels, protective films, and clean surfaces following recommended procedures.
 - 1) Do NOT remove permanent ANSI/AAMA/CSA or NFRC labels.
- B. Waste Management:
 - 1. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

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 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.

1.3 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.

1.4 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. Category One VMR Approved Suppliers. See Section 01 6200 for definitions of Categories:
 - 1. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:
 - a. Contact Information: Russ Farley, phone (800) 574-4369, fax 801-484-6817, or e-mail russf@absdoors.com.
 - 2. Beacon Metals Inc, Salt Lake City, UT www.beacon-metals.com:
 - a. Contact Information: Jared Butler, phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail Jared@beacon-metals.com.

2.2 FINISHES**A. Hardware Finishes:**

1. Finishes for brass or bronze hardware items shall be:
 - a. ANSI / BHMA Finish Code 626.
 - 1) Description: Satin Chromium Plated.
 - 2) Base Metal: Brass. Bronze.
2. Finishes for flat goods items may be:
 - a. ANSI / BHMA Finish Code 630.
 - 1) Description: Satin Stainless Steel.
 - 2) Base Metal: Stainless Steel (300 Series).
3. Materials other than steel, brass, or bronze shall be finished to match appearance satin chromium plated, except flat goods which shall be satin stainless steel.

2.3 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.
 - b. Ives, New Haven, CT www.iveshardware.com.
 - c. McKinney, Scranton, PA www.mckinneyhinge.com.
 - d. PBB, Ontario, CA www.pbbinc.com.
 - e. Stanley, New Britain, CT www.stanleyworks.com.
- B. Hinges:
 - 1. Doors:
 - a. Sizes:
 - 1) 1-3/4 inch non-fire-rated wood doors in wood frames: 4 inches by 4 inches.
 - 2. Use non-removable pins on exterior opening doors.
 - 3. Ball Bearing style hinges only.
 - 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Interior:
 - 1) Hager: BB 1279.
 - 2) Ives: 5BBI.
 - 3) McKinney: TA 2714.
 - 4) MacPro / McKinney: MPB79.
 - 5) PBB: BB81.
 - 6) Stanley: FBB 179.
 - b. Exterior:
 - 1) Hager: BB 1191.
 - 2) Ives: 5BBI.
 - 3) McKinney: TA 2314.
 - 4) PBB: BB21.
 - 5) Stanley: FBB 191.

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

**SECTION 08 7103
SECURING DEVICES**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Items for architectural wood or hollow metal doors.
 - a. Cylinders.
 - b. Exit devices.
 - c. Locksets and latchsets.
 - 2. Miscellaneous Items:
 - a. Chains.
 - b. Padlocks.
- B. Related Requirements:
 - 1. Section 08 7101: Common Hardware Requirements.
 - 2. Miscellaneous padlocks by local Church FM Group.

1.2 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. Abus by Home Security, Commercial Security and Safety Lockout, Phoenix, AZ
www.abus.com.
 - b. Master Lock, Oak Creek, WI.
 - c. Schlage, Colorado Springs, CO www.schlage.com.
 - d. Von Duprin, Indianapolis, IN www.vonduprin.com.
- B. General:
 - 1. Backsets shall be 2-3/4 inches.
- C. Keying Cores: Provide standard ASSA cores for keyed locking devices provided under this Section.
 - 1. Keyways shall be C-345 by Schlage.
- D. 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 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) AL Series with Saturn (SAT) Lever by Schlage.
- E. Padlocks:
 - 1. Class Two Quality Standard: Abus 83 / 45 Series with cylinder to match locksets.

PART 3 - EXECUTION**3.1 CLOSE-OUT ACTIVITIES**

- A. Owner's Instructions:
 - 1. Before Final Acceptance Meeting, send master keys to **FM Group Manage>**.

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 by 3-1/2 inch.
 - 2. Type Two Acceptable Products:
 - a. PS3515, PL3515 / 80301 by Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
 - b. 39E, 30S by Hager, St Louis, MO www.hagerhinge.com.
 - c. 8200, 8302 by Ives, Wallingford, CT www.iveshardware.com.
 - d. 70B, 105x70B by Rockwood Manufacturing Co, Rockwood, PA 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'.
 - 2. Section 08 7108: 'Stops And Holders'.

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. 1461 Series by LCN Closers, Princeton, IL www.lcnclosers.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.
 - 3. Closer-Arm-Stops:
 - a. Closers will not be used as stop unless indicated as closer-arm-stop in contract documents.
 - b. Provide "Spring-Cush" -or- "Spring-H-Cush, by LCN, or equivalent from approved manufacturer, where indicated on door schedule or as required in Hardware Groups.
 - 4. Door Closers on doors that swing 180 degree as shown on Contract Documents:
 - a. Closers shall allow for 180 degree opening without engaging stop function.
 - b. Closers shall have following features:
 - 1) Adjustable sweep speed.
 - 2) Adjustable backcheck.
 - 3) Non-handed, non-sized.
 - 4) Hold open arm function (Friction Hold Open).
 - 5. Door Closers on doors that swing 90 degree as shown on Contract Documents:
 - a. Closers shall allow for 100 degree opening with engaging stop function.
 - b. Closers shall have following features:
 - 1) Adjustable sweep speed.
 - 2) Adjustable backcheck.
 - 3) Non-handed, non-sized.
 - 4) Hold open arm function with thumb turn.

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.
 - b. Hager, St Louis, MO (800) 255-3590 or (314) 772-4400 www.hagerhinge.com.
 - c. Ives, Wallingford, CT www.iveshardware.com.
 - d. Rockwood Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
 - e. Equal as approved by Architect before installation. See Section 01 6200.
- B. Protective Plates:
 - 1. Material: 0.050 inch thick Stainless Steel.
 - 2. Sizes:
 - a. Kick Plates: 10 inches high by width of door less 3/4 inch on each side.
 - b. Armor Plates: 40 inches high by width of door less 3/4 inch 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.
 - 2. Door stops and holders.
- 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.
 - b. Hager, St Louis, MO www.hagerhinge.com.
 - c. Ives, Wallingford, CT www.iveshardware.com.
 - d. Rockwood Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
 - e. Sargent, New Haven, CT (800) 906-6606 or (203) 562-2151 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:

	Interior Wall	Exterior Wall	Floor Mount	Overhead.
b. Hager	236W	255W	243F	---
c. Ives	WS407CCV	WS447	FS438	---
d. Rockwood	409	474 / 475	440 / 441	---
e. Glynn Johnson	---	---	---	GJ 90S
f. Sargent	---	---	---	590S Series
g.	Equal as approved by Architect before Installation. See Section 01 6200.			
- C. Door Stops And Holders:
 - 1. Type Two Acceptable Products:
 - a. Hager: 268F, 268S or 256S, 256W.
 - b. Ives: WS444, WS449, FS446, FS450.
 - c. Rockwood: 472, 473, 476, 477.
 - d. 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. Acoustical seals.
 - 2. Smoke Gaskets.
 - 3. Sweep Strip (door bottom sweep).
 - 4. Thresholds (metal) where required for wood doors and hollow metal doors.
 - 5. Weatherstripping for exterior hollow metal doors.
 - 6. Door bottoms/door sweeps.
- B. Related Requirements:
 - 1. Section 08 4113: 'Aluminum-Framed Entrances And Storefronts' for thresholds.
 - 2. requirements and Approved Suppliers.
 - 3. Section 09 3013: 'Ceramic Tiling' for stone thresholds.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Hager, St Louis, MO www.hagerhinge.com.
 - b. NGP - National Guard Products, Memphis, TN www.ngpinc.com.
 - c. Pemko Manufacturing, Ventura, CA www.pemko.com.
- B. Acoustical Seals:
 - 1. Color as selected by Architect.
 - 2. Type One Acceptable Products:
 - a. Door Bottom Shoe for Wood Door:
 - 1) 13V by NGP.
 - 2) 211V by Pemko.
 - b. Door Bottom Shoe for Metal Door:
 - 1) 779S-A by Hager.
 - 2) 35EV by NGP.
 - 3) 217AV by Pemko.
 - c. Equal as approved by Architect before bidding. See Section 01 6200.
- C. Smoke Gaskets:
 - 1. Color: Black or Charcoal.
 - 2. Type One Acceptable Products:
 - a. 726 by Hager.
 - b. 5050 by NGP.
 - c. PK 55 by Pemko.
 - d. Equal as approved by Architect before bidding. See Section 01 6200.
- D. Thresholds:
 - 1. Type One Acceptable Products:
 - a. Design Criteria:
 - 1) Meet handicap accessibility requirements (ADA):
 - b. Interior Doors at Acoustic Seals, Approved Products:
 - 1) Carpet threshold (carpet to carpet):
 - a) 505S by Hager.
 - b) 414 by NGP.
 - c) 236 by Pemko.
 - 2) Carpet threshold (carpet to concrete, wood, synthetic, or resilient flooring):
 - a) 417 by NGP.
 - b) 174 by Pemko.
 - 3) Saddle threshold:
 - a) 418S by Hager.
 - b) 411 by NGP.
 - c) 151 by Pemko.
 - c. Equals as approved by Architect before bidding. See Section 01 6200.
- E. Weatherstripping:
 - 1. Type One Acceptable Products:
 - a. Finish: clear anodized aluminum.

- b. Perimeter:
 - 1) 800S by Hager.
 - 2) A625 A by NGP.
 - 3) 35041 CP by Pemko.
- c. Equal as approved by Architect before bidding. See Section 01 6200.
- d. Bottom (see Sweepstrip):

PART 3 - EXECUTION**3.1 INSTALLATION**

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

END OF SECTION

SECTION 08 7913
KEY STORAGE AND CONTROL EQUIPMENT

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install key cabinet as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 08 0601: Keying schedule.
 - 2. Section 08 7101: Common Hardware Requirements.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Key Cabinet:
 - 1. Provide cabinet with 60 hooks minimum.
 - 2. 20 ga steel with prime coat and provided with lock.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Place all keys required for every locking device on Project, properly identified by tags and on hooks, before Substantial Completion.

END OF SECTION

**SECTION 08 8100
GLASS GLAZING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Quality of glazing used in entries, doors, and windows.
- B. Related Requirements:
 - 1. Sections Under 08 1000 Heading: 'Doors And Frames' for furnishing and installing of flush wood door lites in new doors.
 - 2. Section 08 4113: 'Aluminum-Framed Entrances And Storefronts' for furnishing and installing of glazing in aluminum-framed storefront.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's data sheets for each glass product and glazing material.
- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation: Final, executed copy of Warranty.

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Meet applicable requirements of Federal Consumer Product Safety Standard 16 CFR 1201.
 - 2. Comply with published recommendations of glass product Manufacturers and organizations, except where more stringent requirements are indicated.
- B. Qualifications:
 - 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
 - a. Satisfactorily completed at least three (3) installations of similar size, scope, and complexity in each of past two (2) years and be approved by glass product Manufacturer before bidding.
 - b. Upon request, submit documentation.
- C. Certifications:
 - 1. Labels showing strength, grade, thickness, type, and quality are required on each piece of glass.
 - 2. Manufacturers/Fabricators certifying products furnished comply with project requirements.
 - 3. Insulating-Glass Certification Program: Indicate compliance with requirements of Insulating Glass Certification Council on applicable glazing products.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Follow Manufacturer's instruction for receiving, handling, and protecting glass & glazing materials to prevent breakage scratching, damage to seals, or other visible damage.
 - 2. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Storage And Handling Requirements:
 - 1. Follow Manufacturer's instruction for storing and protecting glass & glazing materials.
 - 2. Store materials protected from exposure to harmful environmental conditions and at temperatures and humidity conditions recommended by Manufacturer.
 - 3. Protect edge damage to glass, and damage/deterioration to coating on glass.

1.5 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

1.6 WARRANTY

- A. Manufacturer Warranty:
 - 1. Insulating Glass Warranty:
 - a. Manufacturer's standard form, signed by insulating-glass product Manufacturer/Fabricator, agreeing to replace insulating-glass units that exhibit failure of hermetic seal under normal use evidenced by obstruction of vision by dust, moisture, or film on interior surfaces of glass, for ten [10] years of date of installation.
 - 2. Installer's Warranty:
 - a. Form acceptable to Owner, signed by glass product Installer, agreeing to replace glass products that deteriorate, or that exhibit damage or deterioration of glass or glazing products due to faulty installation, for two (2) years from date of installation.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Manufacturers:
 - 1. Manufacturer Contact List for Low E Glazing:
 - a. AGC Flat glass North America, Kingsport, TN www.us.agc.com.
 - b. Carlex (subsidiary of Central Glass Co., Ltd., Nashville, TN www.carlex.com.
 - c. Guardian Industries Corp., Auburn Hills, MI www.guardian.com.
 - d. Oldcastle BuildingEnvelope, Santa Monica, CA www.oldcastlebe.com.
 - e. Pilkington North America Inc., Toledo, OH www.pilkington.com.
 - f. PPG Industries, Pittsburgh, PA www.ppgglass.com or PPG Canada Ltd, Glass Division, Toronto, ON (416) 789-3331.
- B. Design Criteria:
 - 1. Glazing for Fire-Rated Door and Window Assemblies: Glazing tested per NFPA 252 and NFPA 257, as applicable, for assemblies complying with NFPA 80 and listed and labeled per requirements of authorities having jurisdiction.
- C. Exterior Window Glazing:
 - 1. Thickness: 1/8 inch minimum, Double Strength (Insulated Glass).
 - 2. Glazing shall have following characteristics:
 - a. Low-Emissivity (or Low E):
 - 1) Design Criteria:
 - a) Clear:
 - b) Meet requirements of ASTM C1036, Type I, Class I, Quality Q3.
 - c) Location: Surface 2.
 - 2) Type Two Low-Emissivity (or Low E) Acceptable Product:
 - a) Performance Standard:
 - (1) 70 percent Visible Light Transmission (VLT).
 - (2) 0.29 U-value winter.
 - (3) 0.27 U-value summer.
 - (4) 0.38 Solar Heat Gain Coefficient (SHGC).
 - (5) 0.44 Shading Coefficient.
 - (6) 11 percent Visible Light Reflectance.
 - b) Quality Standard:
 - (1) Cardinal LoE³-366.
 - (2) Solarban 70 XL.
 - (3) Other low E glazing system standard with window manufacturer that meets or exceeds performance characteristics of specified glazing is acceptable as approved by Architect before bidding. See Section 01 6200.
 - 3) Acceptable Manufacturers:
 - a) AGC.
 - b) Guardian.
 - c) PPG Industries.
 - d) Equal as approved by Architect before bidding. See Section 01 6200.
 - b. Obscure:
 - 1) Design Criteria:
 - a) Meet requirements of ASTM C1036, Type II, Class I, Form 3, Quality Q8, Pattern - #62.
 - c. Glazing in Windows within 24 inches of Exterior Doors:
 - 1) Design Criteria:
 - a) Tempered.
 - b) Meet requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality Q3.
 - D. Storefront Glazing:
 - 1. Thickness: 1/4 inch.
 - 2. Glazing shall have following characteristics:
 - a. Low-Emissivity (or Low E):
 - 1) Design Criteria:
 - a) Clear.
 - b) Insulated Glass: 1 inch units with 1/2 inch airspace and two (2) 1/4 inch lites.
 - c) Meet requirements of ASTM C1036, Type I, Class I, Quality Q3.
 - d) Location: Surface 2.

- 2) Type Two Low-Emissivity (or Low E) Acceptable Product (North and East Elevation Facing Only):
 - a) Performance Standard:
 - (1) 70 percent Visible Light Transmission (VLT).
 - (2) 0.29 U-value winter.
 - (3) 0.27 U-value summer.
 - (4) 0.38 Solar Heat Gain Coefficient (SHGC).
 - (5) 0.44 Shading Coefficient.
 - (6) 11 percent Visible Light Reflectance.
 - b) Quality Standard:
 - (1) Solarban 60 (2) by PPG.
 - (2) Equal product by Acceptable Manufacturer as approved by Architect before bidding. See Section 01 6200.
 - 3) Type Two Low-Emissivity (or Low E) Acceptable Product (South and West Front Elevation Facing Only):
 - a) Performance Standard:
 - (1) 64 percent Visible Light Transmission (VLT).
 - (2) 0.28 U-value winter.
 - (3) 0.26 U-value summer.
 - (4) 0.27 Solar Heat Gain Coefficient (SHGC).
 - (5) 0.32 Shading Coefficient.
 - (6) 12 percent Visible Light Reflectance.
 - b) Quality Standard:
 - (1) Solarban 70 XL (2) by PPG.
 - (2) Equal product by Acceptable Manufacturer as approved by Architect before bidding. See Section 01 6200.
 - 4) Acceptable Manufacturers:
 - a) AGC.
 - b) Guardian.
 - c) PPG.
 - d) Equal as approved by Architect before bidding. See Section 01 6200.
 - b. Reflective:
 - 1) Description:
 - a) Transparent metal coating applied to surface of glass to reduce amount of solar energy passing through it.
 - 2) Design Criteria:
 - a) Meet requirements of ASTM C1376.
 - 3) Type Two Acceptable Products:
 - a) Miropane T.M Transparent Mirror by Pilkington.
 - b) Equal as approved by Architect in writing before installation. See Section 01 6200.
 - c. Glazing Below Door Height:
 - 1) Design Criteria:
 - a) Tempered.
 - b) Meet requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality Q3.
- E. Fabrication:
1. Except where glass exceeds 66 inches in width, cut clear glass so any wave will run horizontally when glazed.
 2. Sealed, Insulating Glazing Units:
 - a. Double pane, sealed insulating glass units. Install at exterior windows and exterior aluminum-framed storefront.
 - b. Unit Thickness: 5/8 inch minimum, one inch maximum.
 - c. Type Seal:
 - 1) Metal-to-glass bond and separated by 1/2 inch dehydrated air space.
 - 2) Use non-hardening sealants.
 - d. Category Four Approved Fabricators. See Section 01 6200 for definitions of Categories.
 - 1) Members of Sealed Insulating Glass Manufacturer's Association.

2.2 ACCESSORIES

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Glazing Tape: Butyl-based elastomeric tape with integral resilient tube spacer, 10 to 15 Shore A durometer hardness, black color, coiled on release paper; widths required for specified installation, complying with ASTM C1281 and AAMA 800 for application.

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

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DIVISION 09: FINISHES

09 0500 COMMON WORK RESULTS FOR FINISHES

09 0503 FLOORING SUBSTRATE PREPARATION

09 2000 PLASTER AND GYPSUM BOARD

09 2216 NON-STRUCTURAL METAL FRAMING

09 2226 METAL SUSPENSION SYSTEM: GYPSUM BOARD

09 2900 GYPSUM BOARD

09 3000 TILING

09 3013 CERAMIC TILING

09 5000 CEILINGS

09 5113 ACOUSTICAL PANEL CEILINGS

09 5323 METAL ACOUSTICAL SUSPENSION ASSEMBLIES

09 6000 FLOORING

09 6513 RESILIENT BASE AND ACCESSORIES

09 6519 RESILIENT TILE FLOORING

09 6816 SHEET CARPET: BACK CUSHION, DIRECT GLUE

09 7000 WALL FINISHES

09 7720 DECORATIVE FIBERGLASS REINFORCED WALL PANELS

09 9000 PAINTS AND COATINGS

09 9001 COMMON PAINTING AND COATING REQUIREMENTS

09 9112 EXTERIOR PAINTED FERROUS METAL

09 9113 EXTERIOR PAINTED GALVANIZED METAL

09 9114 EXTERIOR PAINTED CMU, CONCRETE, STUCCO

09 9123 INTERIOR PAINTED GYPSUM BOARD, PLASTER

09 9124 INTERIOR PAINTED METAL

09 9125 INTERIOR PAINTED WOOD

09 9324 INTERIOR CLEAR-FINISHED HARDWOOD

09 9413 INTERIOR TEXTURED FINISHING

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**SECTION 09 0503
FLOORING SUBSTRATE PREPARATION**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Prepare and test floors to receive carpet and resilient flooring as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 01 1000: Carpet and carpet base and carpet tile furnished and installed by Owner.
 - 2. Section 03 3111: Installation tolerances for concrete slabs.

1.2 REFERENCES

- A. Reference Standards:
 - 1. ASTM International:
 - a. ASTM F 1869-04, 'Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.'

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Schedule pre-installation conference one month minimum before Substantial Completion. Conference shall include Contractor, Architect, and Owner. At Owner's option and additional expense, Owner's flooring installer will be invited to conference.
 - 2. Review condition of floor with regard to compliance with concrete installation tolerances and other work necessary to prepare floors for installation of carpet and resilient flooring.
 - 3. Examine results of slab vapor emission and pH tests during meeting.

1.4 SUBMITTALS

- A. Informational Submittals: Three copies of vapor emission and pH tests.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Provide storage space and protection for flooring and installation accessories if materials delivered before Substantial Completion.

1.6 FIELD CONDITIONS

- A. Ambient Conditions: Bring conditions inside building to levels normal at occupancy of building 24 hours prior to beginning slab testing. Maintain these conditions from beginning of slab testing until completion of tests. These conditions include minimum ambient temperature of 65 deg F 18 deg C, relative humidity between 10 and 65 percent, and minimum concrete slab temperature of 65 deg F 18 deg C.

PART 2 - PRODUCTS**2.1 EQUIPMENT**

- A. Test Kit:
 - 1. Class Two Quality Standard. See Section 01 6200.
 - a. Moisture / Alkali Test Kit Number 625 for calcium chloride and pH testing by Taylor Tools, a Division of Roofing Equipment Inc, Denver, CO www.taylorflooringtools.com.

PART 3 - EXECUTION**3.1 PROCEDURE**

- A. Floor Preparation:
 - 1. Remove paint, sealer, grease, oil, silicone sealants, curing compounds, and other materials incompatible with carpet adhesive.
 - 2. Five days before Substantial Completion, plus or minus one day, and in conjunction with final cleaning specified in Section 01 7400, vacuum and damp mop floor areas to receive flooring.

3.2 FIELD QUALITY CONTROL

- A. Field Testing:
 - 1. 72 hours before pre-installation conference, test slab for water vapor emissions in accordance with ASTM F 1869 except place moisture-testing kits as follows:
 - a. One test near center of North wall in room to be carpeted.
 - b. One test near center of South wall in room to be carpeted.
 - c. One test at lowest grade of floor to be carpeted.
 - d. One test near center of Chapel.
 - 2. Perform a pH test in conjunction with each vapor emission test.

END OF SECTION

**SECTION 09 2216
NON-STRUCTURAL METAL FRAMING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install metal framing and furring systems and blocking as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 05 4010: 'Cold-Formed Load-Bearing Metal Framing'.
 - 2. Section 06 1100: 'Wood Framing' for wood blocking.
 - 3. Section 09 2226: 'Metal Suspension System' for furring on suspended ceilings.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Schedule pre-installation conference to be held after submittals have been reviewed and returned by Architect, but before beginning metal framing work.
 - 2. In addition to agenda items specified in Section 01 3100, review following:
 - a. Identify location of required blocking.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Show special components and installations not fully dimensioned or detailed in Manufacturer's Product data.
- B. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. ATI, ICC or other Approved Testing Agency (active member) Evaluation Report.
 - 2. Manufacturer Instructions:
 - a. Technical product data, installation instructions, and recommendations for each component of system.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. ICC approved.

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Manufacturers:
 - 1. Type One Acceptable Manufacturers:
 - a. CEMCO, City of Industry, CA www.cemcosteel.com.
 - b. ClarkDietrich Building Systems, West Chester, OH www.clarkdietrich.com.
 - c. Any member of Steel Framing Industry Association (SFIA).
 - d. Any member of Steel Stud Manufacturer's Association (SSMA).
 - e. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Materials:
 - 1. Framing:
 - a. General:
 - 1) 20 gauge minimum, unless noted greater on Drawings, meeting requirements of ASTM C645.
 - 2) Steel Sheet Components: Comply with ASTM C645 requirements for metal unless otherwise indicated.
 - 3) Steel Coating Requirement: Comply with ASTM C645 roll-formed from hot dipped galvanized steel complying with ASTM A1003/A1003M and/or ASTM A653/A653M G40 (Z120) or equivalent corrosion resistant coating. A40 galvanized products are not acceptable.
 - a) Coatings shall demonstrate equivalent corrosion resistance with evaluation report from approved testing agency.
 - b. Steel Studs and Runners: Cold-formed galvanized steel C-studs, as per ASTM C645 for conditions indicated.
 - c. Bridging, blocking, strapping, and other accessories shall be as described in Contract Documents or as required by Manufacturer's system.
 - d. Type One Acceptable Products:
 - 1) 362DS20P by CEMCO.
 - 2) ProSTUD 20 by ClarkDietrich Building Systems.

- 3) 20 Ga 3-5/8 SS Series by Steeler Inc.
 - 4) Any member of Steel Framing Industry Association (SFIA).
 - 5) Any member of Steel Stud Manufacturer's Association (SSMA).
 - 6) Equal as approved by Architect before bidding. See Section 01 6200.
2. Firestop Tracks:
 - a. Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
3. Headers and Jambs - Heavy-Duty Stud:
 - a. Shape used to form header beams and jambs, columns or posts, of web depths indicated, unpunched, with stiffened flanges.
- C. Fasteners:
 1. Corrosion resistant coated, self-drilling, self-threading steel drill screws complying with ASTM C1513.

2.2 ACCESSORIES

- A. Sill Sealer: Closed-cell polyethylene foam, 1/4 inchthick by width of plate.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work:
 1. Coordinate with other Sections to provide blocking necessary for their work.
 2. Coordinate with other Sections for location of blocking required for installation of equipment and building specialties.
- B. Tolerances:
 1. 1/4 inch in 20 feet, non-cumulative in length of wall.
 2. 1/8 inch in 10 feet with 1/4 inchmaximum in height of wall.
 3. Distances between parallel walls shall be 1/4 inch maximum along length and height of wall.
- C. Framing:
 1. Installation Standard: ASTM C754.
 2. Specifications of Stud Wall Manufacturer shall govern this work unless more stringent requirements are required by Contract Documents.
 3. Install specified sill sealer under sill plates of exterior walls and of acoustically insulated interior walls.
 4. Stiffen metal-framed walls with 3/4 inch1-1/2 inches cold formed channels placed horizontally approximately 48 inch on center and securely attach to each stud.
 5. Similarly reinforce door and window openings at headers with reinforcing channel extending 18 inches minimum each side of opening.
 6. Apply double framing members at openings. Wrap multiple, adjacent framing members with duct tape or otherwise secure to eliminate 'chattering'.
 7. Use grommets at framing penetrations where unsecured items pass through.

END OF SECTION

SECTION 09 2226
METAL SUSPENSION SYSTEM: Gypsum Board

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install metal suspension system for supporting gypsum drywall in typical ceiling and soffit areas and to support items penetrating ceiling as described in Contract Documents including:
 - a. Hanger wires, fasteners, main runners/tees, cross runners/tees, and wall molding/track.
- B. Related Requirements:
 - 1. Section 09 2900: 'Gypsum Board'.
 - 2. Section 26 5100: 'Interior Lighting' for electrical fixtures installed in ceiling.
 - 3. Division 21: 'Fire Suppression' for sprinklers installed in ceiling.
 - 4. Division 23: 'Mechanical' for related sections for HVAC installed in ceiling.
 - 5. Division 26: 'Electrical' for related electrical work.
 - 6. Division 27: 'Communications' for related sound and video work.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate layout of suspension system with other construction that penetrates ceilings or is supported by them, including drywall furring, light fixtures, HVAC equipment, and fire-suppression systems.
 - 2. All work above ceiling should be completed prior to installing suspended system. There should be no materials resting against or wrapped around suspension system, hanger wires or ties.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Provide Manufacturer's technical literature on suspension system including listing dimensions, load carrying capacity and standard compliance.
 - 2. Samples:
 - a. Minimum 8 inchlong samples of suspension system components, including main runner/tee and cross runner/tee with couplings.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.
 - b. Installer's certificates of training.
 - 2. Manufacturer's Instructions:
 - a. Seismic Design Categories D, E and F:
 - 1) Manufacturer's details and installation instructions for seismic bracing. If requested, provide copy of code requirements applicable to Project.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. All system components conform to ASTM standards.
 - 2. Fire-Resistance Rating: UL approved metal suspension system.
 - 3. Seismic Standard: Acoustical ceilings shall be designed and installed to withstand effects of earthquake motions according to following requirements:
 - a. Cisca's Recommendations for Acoustical Ceilings: Comply with Cisca's *'Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings-Seismic Zones 0-2'* (Apply to Seismic Categories A & B).
 - b. Cisca's Guidelines for Systems Requiring Seismic Restraint: Comply with Cisca's *'Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies-Seismic Zones 3 & 4'* (Apply to Seismic Categories C, D, E & F).
 - c. Seismic Design Categories D, E and F:
 - 1) Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E580/E580M.
 - 2) Meet seismic bracing requirements of ASCE 7, ASTM C635/C635M and ASTM C636/C636M or equivalent governing standard for project site.
- B. Qualifications. Requirements of Section 01 4301 applies, but not limited to following:
 - 1. Installer:
 - a. Installer training ('Ceiling Masters' training course or equivalent).

2. Manufacturer:
 - a. Manufacturer in good standing of CISCA (Ceiling and Interior Systems Construction Association).

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
 1. Materials shall be delivered in original, unopened packages with labels intact.
 2. Store material in fully enclosed space protected against damage from moisture, direct sunlight, surface contamination, and general damage.

1.6 WARRANTY

- A. Manufacturer Warranty:
 1. Manufacturer standard ten (10) years warranty on suspension system including repair or replacement of rusting as defined by ASTM D610.

PART 2 - PRODUCTS

2.1 SYSTEMS

- A. Manufacturers:
 1. Type One Acceptable Systems:
 - a. Drywall Grid by Armstrong World Industries, Lancaster, PA www.armstrongceilings.com.
 - b. Drywall Grid System by Chicago Metallic Corporation, Chicago, IL www.chicagometallic.com.
 - c. Drywall Suspension System - Flat Ceilings by USG, Chicago, IL www.usg.com.
 - d. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Components:
 1. Main Runners/Tee and Cross Runners/Tee:
 - a. Heavy-duty in accordance with ASTM C635/C635M.
 - b. Cold-formed from ASTM A653/A653M, CS Type B steel and hot dipped galvanized G-40 coating for interior ceilings.
 - c. Double-Web construction.
 2. Wall Track/Molding.
 3. Fasteners:
 - a. Nails are not permitted when subjected to direct tension such as installed vertically into bottom of structural member.
 - b. Metal attachment:
 - 1) Acoustical Eye Lag Screws:
 - a) 1/4 inch screws zinc coated with self-drilling or self-piercing sharp point.
 - c. Wood attachment:
 - 1) Acoustical Eye Lag Screws:
 - a) 3 inch x 1/4 inch screws zinc coated for wood joists with Type 17 self-drilling point.
 - d. Wire Tie to Metal Structural Member attachment:
 - 1) Wire wrapped to structural member with pigtail knot with three (3) tight wraps within 3 inch length at top connection.
 4. Hanger Wires, Braces, and Ties:
 - a. Zinc-Coated, carbon-steel wire meeting requirements of ASTM A641/A641M, Class 1 zinc coating, soft temper.
 - b. Size:
 - 1) Standard size: 12 gauge (0.105 inch) galvanized, soft annealed steel wire.
 - 2) Select wire diameter so its stress is less than yield when loaded at three (3) times hanger design load (ASTM C635/C635M), Table 1, 'Direct Hung') will be less than yield stress of wire, but provide not less than 12 gauge (0.105 inch).
 - c. Protect with rust inhibitive paint.
 5. Seismic Joint Clip:
 - a. Required for Seismic Design Categories D, E and F.
 - 1) Quality Standard Product:
 - a) SJCG by Armstrong.
 - b) Equal as approved by Architect before bidding. See Section 01 6200.
 6. Compression Posts/Struts:
 - a. Required for Seismic Design Categories D, E and F.
 - 1) Meet seismic requirements for Project.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verification Of Conditions:
 - 1. Inspect area receiving suspension system to identify conditions which will adversely affect installation.
 - a. Work trades work to be thoroughly dry and complete prior to installation.
 - b. Verify weather tightness of area to receive suspension system prior to installation.
 - 2. Notify Architect of unsuitable conditions in writing.
 - a. Do not install suspension system until adverse conditions have been remedied.

3.2 INSTALLATION

- A. Interface With Other Work:
 - 1. All work above ceiling should be completed prior to installing suspended ceiling system including related work including: drywall furring work, acoustical tile, light fixtures, mechanical systems, electrical systems, and sprinklers.
- B. General:
 - 1. Install suspension system in accordance with Manufacturer's written instructions, and in compliance with ASTM installation standard, and applicable codes as required by AHJ with modifications listed below except where Manufacturer's instructions are more stringent:
 - a. Main runners/tees hanger wires 48 inches on center maximum.
 - b. Cross runners/tees hanger wires 24 inches on center maximum.
 - c. Do not kink, twist, or bend hanger wires as a means of leveling assembly.
 - 2. Hanger Wires:
 - a. Install hanger wire to structure as required with necessary on center spacing to support expected ceiling load requirements, following local practices, codes and regulations. Attach with pigtail knot with three (3) tight wraps within 3 inch length at each end.
 - b. Provide additional wires at light fixtures, grilles, and access doors where necessary by appropriate method in accordance with industry accepted practice.
 - c. Additional Hanger Wires: Wrapped tightly three (3) full turns within 3 inch length to structure and component at locations where imposed loads could cause deflection exceeding 1/360 span.
- C. Seismic:
 - 1. Required for Seismic Design Categories D, E and F:
 - a. Installation must be in accordance with ASCE 7.
- D. Tolerances:
 - 1. Main Runners/Tees:
 - a. Installed and leveled to meet IBC requirements to within 1/4 inch in 10 foot with supporting wire taut to prevent any subsequent downward movement of main runners when ceiling loads are imposed.
 - 2. Cross Runners/Tees:
 - a. Main runners, or other cross runners, must support cross runners to within 1/32 inch of required center-to-center spacing. This tolerance must be noncumulative beyond 12 feet
 - b. Intersecting runners must be installed to form right angle to supporting members.

3.3 FIELD QUALITY CONTROL

- A. Field Inspections:
 - 1. Inspect:
 - a. Suspended ceiling system.
 - b. Hanger wires, braces, ties, anchors and fasteners.
- B. Non-Conforming Work:
 - 1. Remove and replace defective materials at no additional cost to Owner.

END OF SECTION

**SECTION 09 2900
GYPSUM BOARD****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install gypsum board as described in Contract Documents.
 - 2. Furnish and install acoustical sealants as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 09 2216: 'Non-Structural Metal Framing'.
 - 2. Section 09 3013: 'Ceramic Tile' for installation of backerboard joint reinforcing.
 - 3. Section 09 9413: 'Interior Textured Finishing'.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Schedule pre-installation conference immediately before installation of gypsum wallboard.
 - 2. In addition to agenda items specified in Section 01 3100, review following:
 - a. Finish requirements necessary for installation of finish materials over gypsum wallboard, and location and installation of ceramic tile backerboard.

1.3 SUBMITTALS

- A. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. Fire test results or assembly diagrams and numbers confirming products used will provide required fire ratings with installation configurations used.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. General:
 - 1. Following recommendations of GA-801 Guide for Handling and Storage of Gypsum Panel Products unless local, state or federal laws or agency rules differing from the recommendations shall take precedence.
- B. Delivery And Acceptance Requirements:
 - 1. Deliver materials in original packages, containers, or bundles bearing brand name, applicable standard designation, and Manufacturer's name.
- C. Storage And Handling Requirements:
 - 1. Store material under roof and keep dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack gypsum board flat to prevent sagging.

1.5 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Comply with ASTM C840 or GA-216 requirements, whichever are more stringent:
 - a. Do not install interior products until installation areas are enclosed and conditioned.
 - 1) Temperature shall be 50 deg F and 95 deg F maximum day and night during entire joint operation and until execution of Certificate of Substantial Completion.
 - 2) Provide ventilation to eliminate excessive moisture.
 - 3) Avoid hot air drafts that will cause too rapid drying.
 - b. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
- B. Provide adequate lighting for finishing process.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. American Gypsum, Dallas, TX www.americangypsum.com.
 - b. CertainTeed Gypsum, Inc; Tampa, FL www.certainteed.com.
 - c. Georgia Pacific, Atlanta, GA www.gp.com.
 - d. National Gypsum, Charlotte, NC www.nationalgypsum.com.
 - e. Pabco Gypsum, Newark, CA www.pabco gypsum.com.
 - f. United States Gypsum Co, Chicago, IL www.usg.com.
- B. Materials:
 - 1. Interior Gypsum Board:
 - a. General:

- 1) Size:
 - a) Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- 2) Class Two Quality Standard:
 - a) Core: Fire-resistant rated gypsum core.
 - b) Complies with Type X requirements of ASTM C1396/C1396M (Section 5).
 - c) Surface paper: Face paper suitable for painting.
 - d) Long edges: Tapered edge.
 - e) Overall thickness: 5/8 inch.
2. Glass Mat Gypsum Tile Backer:
 - a. Product meeting requirements of ASTM C1178/C1178M.
 - b. 5/8 inch.
 - c. Square edges.
 - d. Category Four Approved Manufacturer. See Section 01 6200 for definitions of Categories:
 - 1) DensShield Tile Backer by Georgia Pacific.
 - 2) GlasRoc Tilebacker by CertainTeed.

2.2 ACCESSORIES

A. Manufacturers:

1. Manufacturer Contact List:
 - a. Kinetics Noise Control, Dublin, OH www.kineticsnoise.com.
 - b. Magnum Products, Lenaxa, KS www.levelcoat.com.
 - c. National Gypsum, Charlotte, NC www.nationalgypsum.com.
 - d. Soundproofing Co, San Marcos, CA www.soundproofing.org.
 - e. United States Gypsum Co, Chicago, IL www.usg.com.
 - f. Westpac Materials Inc, Orange, CA www.westpacmaterials.com.
2. Gypsum Board Mounting Accessories:
 - a. Corner And Edge Trim:
 - 1) Paper-faced metal, or paper-faced plastic meeting requirements of ASTM C1047. Surfaces to receive bedding cement treated for maximum bonding.
 - b. Control Joint:
 - 1) Bent zinc sheet with V-shaped slot, perforated flanges, covered with plastic tape meeting requirements of ASTM C1047.
3. Joint Compound:
 - a. Best grade or type recommended by Board Manufacturer and meeting requirements of ASTM C475/C475M.
 - 1) Use Taping Compound for first coat to embed tape and accessories.
 - 2) Use Taping Compound or All-Purpose Compound for subsequent coats except final coat.
 - 3) Use Finishing Compound for final coat.
4. Joint Reinforcing:
 - a. Paper reinforcing tape acceptable to Gypsum Board Manufacturer.
5. Fasteners:
 - a. Bugle head screws meeting requirements of ASTM C1002:
 - 1) Gypsum Board:
 - a) Type W: For fastening gypsum board to wood members, of length to penetrate wood framing 5/8 inch minimum.
 - 2) Glass Mat Gypsum Tile Backer:
 - a) Wood Framing: 11 ga (0.1233 in galvanized with 7/16 inch head, hot dipped. Screws: Type W or Type S Hi-Lo, bugle head, rust resistant.
 - b) Metal Framing:
 - (1) Light-gauge metal framing: Type S Hi-Lo, bugle or wafer head, self-tapping, rust resistant. Hi-Lo screws.
 - (2) Heavy-gauge metal framing: Type S-12 Hi-Lo, bugle or wafer head, rust resistant.
 - b. Corner and edge trim must be mechanically attached and not clinched.

B. Primer / Surfacers On Surfaces To Receive Texturing:

1. Type Two Acceptable Products:
 - a. Sheetrock First Coat by USG.

- b. Prep Coat by Westpac Materials.
- c. Level Coat by Magnum Products.
- d. Equal as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
 - 1. Examine substrate and verify framing is suitable for installation of gypsum board.
 - 2. Examine gypsum board before installation. Reject panels that are wet, moisture damaged, and mold damaged.
 - 3. Notify Architect of unsuitable conditions in writing.
 - a. Do not install board over unsuitable conditions.
 - 4. Commencement of Work by installer is considered acceptance of substrate.

3.2 INSTALLATION

- A. Interface With Other Work:
 - 1. Coordinate with Division 06 for location of back-blocking for edges and ends of gypsum board and for blocking required for installation of equipment and building specialties.
 - 2. Do not install gypsum board until required blocking is in place.
- B. General: Install and finish as recommended in ASTM C840 or GA-216 unless specified otherwise in this Section.
- C. Interior Gypsum Board:
 - 1. General:
 - a. Install so trim and reinforcing tape are fully backed by gypsum board. No hollow spaces between pieces of gypsum board over 1/8 inch wide before taping are acceptable.
 - b. Rout out backside of gypsum board to accommodate items that extend beyond face of framing, but do not penetrate face of gypsum board, such as metal door frame mounting brackets, etc.
 - c. Gypsum Board installed to walls shall run to within 1/8 inch of floor.
 - d. Finish light coves and other hidden from view surfaces within finished areas same as exposed surfaces.
 - e. On walls over 108 inches high, apply board perpendicular to support.
 - f. Butt edges in moderate contact. Do not force in place. Shim to level.
 - g. Leave facings true with joint, finishing flush. Vertical work shall be plumb and ceiling surfaces level.
 - h. Scribe work closely:
 - 1) Keep joints as far from openings as possible.
 - 2) If joints occur near an opening, apply board so vertical joints are centered over openings.
 - 3) No vertical joints shall occur within 8 inches of external corners or openings.
 - i. Install board tight against support with joints even and true. Tighten loose screws.
 - 2. Double Layer Acoustical Installation, Including but not limited to offices:
 - a. First Gypsum Board Layer:
 - 1) Install with minimum 1/8 inch gap between all panel joints.
 - 2) Caulk all joints with specified acoustical sealant.
 - 3) Install second layer gypsum board. Tape and finish to scheduled finish level.
 - 3. Multiple Layer Wall Installation:
 - a. Walls composed of non-acoustical multiple layer gypsum board assemblies shall be installed using either of the two following methods.
 - 1) Each layer will be secured with specified fastener spacing at each layer.
- or -
 - 2) Secure first layer with specified fastener spacing, apply skim coat at middle layers with modified fastener spacing, install final layer gypsum board over skim coat with specified fastener spacing.
 - 4. Ceilings:
 - a. Apply ceilings first using minimum of two (2) men.
 - b. Use board of length to give minimum number of joints.
 - c. Apply board perpendicular to support.
 - d. Double Layer:
 - 1) Double Layer Application:

- a) Apply base layer:
 - (1) End and edge joints of board applied on ceilings do not need to be back blocked in field area of ceiling.
 - (2) 2x4 blocking is required at wall to ceiling transitions and at top of ceiling vault transitions.
 - b) Apply face layer with joints staggered in relationship to base and occurring over supports:
 - (1) Use combination of adhesive and screws if required to meet Manufacturer's specifications for fire-rated assembly.
 - (2) Apply screws attaching face layer through base layer into support for specified penetration.
5. Fastening:
- a. Apply from center of board towards ends and edges.
 - b. Apply screws 3/8 inch minimum from ends and edges, one inch maximum from edges, and 1/2 inch maximum from ends.
 - c. Spacing:
 - 1) Ends: Screws not over 7 inches on center at edges where blocking or framing occurs.
 - 2) Wood Framed Walls And Ceilings: Screws 7 inches on center in panel field.
 - 3) Metal Framed Walls: Screws 12 inches on center in panel field.
 - d. Set screw heads 1/32 inch below plane of board, but do not break face paper. If face is accidentally broken, apply additional screw 2 inches away.
 - e. Screws on adjacent ends or edges shall be opposite each other.
 - f. Drive screws with shank perpendicular to face of board.
6. Trim:
- a. Corner Beads:
 - 1) Mechanically attached.
 - 2) Attach corner beads to outside corners.
 - a) Attach metal corner bead with staples spaced 4 inches on center maximum and flat taped over edges of corner bead. Also, apply screw through edge of corner bead where wood trim will overlay corner bead.
 - b) Set paper-faced trim in solid bed of taping compound.
 - b. Edge Trim: Apply where gypsum board abuts dissimilar material. Hold channel and 'L' trim back from exterior window and door frames 1/8 inch to allow for caulking.
7. Finishing:
- a. General:
 - 1) Tape and finish joints and corners throughout building as specified below to correspond with final finish material to be applied to gypsum board. When sanding, do not raise nap of gypsum board face paper or paper-faced trim.
 - 2) First Coat:
 - a) Apply tape over center of joint in complete, uniform bed of specified taping compound and wipe with a joint knife leaving a thin coating of joint compound. If metal corner bead is used, apply reinforcing tape over flange of metal corner bead and trim so half of tape width is on flange and half is on gypsum board.
 - b) Completely fill gouges, dents, and fastener dimples.
 - c) Allow to dry and sand lightly if necessary to eliminate high spots or excessive compound.
 - 3) Second Coat:
 - a) Apply coat of specified joint compound over embedded tape extending 3-1/2 inches on both sides of joint center. Use finishing compound only if applied coat is intended as final coat.
 - b) Re-coat gouges, dents, and fastener dimples.
 - c) Allow to dry and sand lightly to eliminate high spots or excessive compound.
 - 4) Third Coat: Apply same as second coat except extend application 6 inches on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
 - 5) Fourth Coat: Apply same as second coat except extend application 9 inches on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.

1. Finishing Levels: Finish panels to levels indicated below and according to ASTM C840, GA-214 and GA-216:
 - a. Gypsum Board Surfaces not painted or finished:
 - 1) GA-214 Level 1:
 - a) All joints and angles shall have tape set in joint compound.
 - b) Apply second joint compound coat at all joints and over screws.
 - c) Surface shall be free of excess joint compound.
 - d) Small tool marks and ridges are acceptable'.
 - b. Gypsum Board Surfaces Under Acoustical Tile:
 - 1) GA-214 Level 2:
 - a) Joints and angles shall have tape embedded in joint compound and wiped with joint knife leaving thin coating of joint compound over all joints and angles.
 - b) Fastener heads and accessories shall be covered with a coat of joint compound.
 - c) Surfaces shall be free of excess joint compound.
 - d) Small tool marks and ridges are acceptable.
 - e) Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.
 - 2) Note: It is critical that gypsum board ceiling be smooth before installing ceiling tile. Drywall joints must be as specified in paragraph above.
 - c. Gypsum Board Surfaces to Receive: Wall Covering Type A - Section 09 7226: 'Sisal Wall Covering':
 - 1) GA-214 Level 3:
 - a) All joints and angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and angles.
 - b) Fastener heads and accessories shall be covered with two separate coats of joint compound.
 - c) All joint compound shall be smooth and free of tool marks and ridges.
 - d. Gypsum Board Surfaces to Receive: Wall Covering Type B - Section 09 7216, 'Vinyl-Coated Fabric Wall Covering':
 - 1) GA-214 Level 4:
 - a) All joints and angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over angles.
 - b) Fastener heads and accessories shall be covered with three separate coats of joint compound.
 - c) All joint compound shall be smooth and free of tool marks and ridges.
 - e. Gypsum Board Surfaces to Receive: Painted Texturing - Section 09 9413: 'Interior Textured Finishing':
 - 1) GA-214 Level 4:
 - a) All joints and angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over angles.
 - b) Fastener heads and accessories shall be covered with three separate coats of joint compound.
 - c) All joint compound shall be smooth and free of tool marks and ridges.
 - 2) Wet-Sponge entire surface and allow to dry.
 - 3) Roll entire prepared surface with primer specified in this section, rolled in one direction only, and tinted beige, and of a thickness to completely cover underlying surface.
 - 4) Apply texture as specified in 09 9413.
- D. Glass Mat Gypsum Tile Backer:
 1. Apply glass mat gypsum tile backer to framing. Attach using specified fasteners spaced 6 inches on center on edges and into all framing members. Drive screws flush with surface of board.
 2. Shim board to be plumb and flat or level and flat, depending on location.
 3. Apply reinforcing only at joints where abutting different materials.

3.3 FIELD QUALITY CONTROL**A. Non-Conforming Work:**

1. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - a. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.4 CLEANING

- A. Remove from site debris resulting from work of this Section including taping compound spills.**

END OF SECTION

**SECTION 09 3013
CERAMIC TILING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install tile and tile setting materials and accessories as described in Documents.
- B. Related Requirements:
 - 1. Section 09 2900: 'Gypsum Board' for installation of backerboard tile, except for joint reinforcing.
 - 2. Section 22 1319: 'Facility Sanitary Sewer Specialties' for floor drains installed in 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 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.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Samples:
 - a. Sample showing all types of tile, grout, and colors.
 - 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.
- D. Maintenance Material Submittals:
 - 1. Extra Stock Materials:
 - a. Ten (10) paver tile and two (2) pieces of paver tile base.
 - b. Twenty-five (25) wall tile and five (5) pieces of cove base.

1.4 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 Manufacturer'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.

1.5 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.

1.6 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 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 and rising for application of epoxy and furan unless otherwise specifically authorized by Manufacturer.
4. Maintain epoxy at stable temperature between 60 deg F and 90 deg F during curing period.

1.7 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.
 - 1) Contact Information: Don Richards (206) 979-0401
www.Don.richards@ArdexAmericas.com.
- b. Custom Building Products, Seal Beach, CA www.custombuildingproducts.com.
 - 1) Contact Information: John Gallup (206) 718.6024 johng@cbpmail.net.
- c. Dal-Tile Corp., Div. of Mohawk Industries, Dallas, TX www.daltile.com.
- d. Interceramic Inc., Garland, TX www.interceramic.com.
- e. Laticrete International Inc., Bethany, CT www.laticrete.com.
- f. Mapei Americas Headquarters, Deerfield Beach, FL www.mapei.com.
 - 1) Contact Information: Bart A. Wilde (801) 467-2060 www.bwilde@mapei.com.
- g. Merkrete, by Parex USA, Inc., Anaheim, CA www.merkrete.com.
 - 1) Contact Information: Andy Townes (505) 873-1181 andy.townes@parexusa.com.
- h. Schluter Systems L.P., Plattsburgh, NY 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 - www.daltileproducts.com or 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.
 - b) Second Contact: Jose Valdez, phone (214) 503-5507, fax (877) 551-1979 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.
 - 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. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Daltile.
- b. Tile Sizes:
 - 1) Tile: 8 inches square.
 - 2) Cove Base: 6 inches by 8 inches.
 - 3) Cove Base: 6 inches by 8 inches with bull-nosed top:
 - a) External and internal corner pieces to match with bull-nosed top.
- c. Category Four Approved Color/Sheen:
 - 1) Daltile: Fuori Di Bianco CD 39.

2. Ceramic Tile:

- a. Wall Tile:
 - 1) Walls: 4-1/4 inches by 4-1/4 inches.
 - 2) Ceramic Tile Base:
 - a) 4-1/4 inch high, A3401 cove base.
 - b) When base only is installed at painted walls, use one course of cove base and one course of bull-nose wall tile.
 - 3) Approved Color:
 - a) Room Walls - Color No 1:
 - (1) 0100 White by Dal-Tile.
 - b) Band Color - Color No 2:
 - (1) 0182 Suede Gray by Dal-Tile.
 - c) Accent Color - Men Restroom: Color 3:
 - (1) DM-14, Cobalt by Dal-Tile.
 - d) Accent Color - Women Restroom: Color 4:
 - (1) QO94, Chianti by Dal-Tile.

E. Materials:

1. Paver Tile:

- a. Category Four Approved Products. See Section 01 6200 for definition of Categories:
 - 1) Porcelato Graniti by Daltile.

2. Wall Tile:

- a. Category Four Approved Products. See Section 01 6200 for definition of Categories:
 - 1) Semi-Gloss or Matte by Dal-Tile.

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.
- 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.
 - b. Standard color to closely match grout joints as selected by Architect.
- 6. Backer Board Joint Reinforcing: 2 inch wide glass fiber mesh tape.
- 7. Tile Setting Products:
 - a. Use only products of same Manufacturer to validate warranty.
 - 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: No. 20 Ocean Gray.
 - b) CUSTOM: No. 335 Winter Gray.
 - c) LATICRETE: No. 42 Platinum.
 - d) MAPEI: No. 19 Pearl Gray.
 - e) MERKRETE: Pro Epoxy D-38 Grey.
- 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 thick by door jamb width by door opening width (see Contract Drawings). Cross-section to meet handicap accessibility requirements.
- F. Penetrating Sealer:
 - 1. Aqua Mix Sealer's Choice Gold, by Custom Building Products.
- G. 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. 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. 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 from required plane shall be plumb and true with square corners.
 - 2. Variation In Slab Grade:
 - a. Plus or minus 1/8 inch in any 10 feet of floor slab and distance between high point and low point of slab of 1/2 inch.
 - b. Slab Testing Procedure:
 - 1) Place ends of straightedge on 3/8 inch high shims.
 - 2) Floor is satisfactory if 1/4 inch diameter steel rod rolled under straightedge will not touch anywhere along 10 foot length and 1/2 inch diameter steel rod will not fit under straightedge anywhere along 10 foot 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 wall tile layout across width of wall so sides are equal.
 - d. Center wall tile layout vertically so top and bottom courses are equal.
 - e. Center floor tiles within room so that borders are equal.
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 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.
10. Inside corners and wall base/floor tile joints shall have 1/8 inch full thick void – filled with sealant.
11. Do not top set base.

E. Application On Concrete Floor:

1. On Mortar Bed:
 - a. Apply mortar bed to depth equal to depression in slab minus 1/2 inch.
 - 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 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 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 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 hardboard, plywood, or similar material.

END OF SECTION

SECTION 09 5113
ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install acoustical ceiling panels for suspended acoustical ceilings as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 09 5323: 'Metal Acoustical Suspension Assemblies'.
 - 2. Section 26 5100: 'Interior Lighting' for light fixtures.
 - 3. Division 23: Related sections for HVAC installed in ceiling.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Produce Data: Technical data for each type of acoustical ceiling unit required.
 - 2. Sample: Minimum 6 inch x 6 inch samples of specified acoustical panel.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Manufacturer's certifications that products comply with specified requirements including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry approved independent laboratory classification of NRC, CAC, and AC.
 - 2. Test And Evaluation Reports:
 - a. If requested by Owner, provide copies of Quality Assurance requirements for 'Class A' flame spread rating and 'Room-Corner Test'.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation:
 - 1) Final, executed copy of Warranty.
 - b. Record Documentation:
 - 1) Manufacturers Documentation:
 - a) Manufacturer's literature.
 - b) Color and pattern selection.
- D. Maintenance Material Submittals:
 - 1. Extra Stock Materials:
 - a. Provide Owner with two (2) cartons of each pattern and color used on Project for future use.
 - 1) Packaged with protective covering for storage and identified with appropriate labels.

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Fire-Test-Response Characteristics: As determined by testing identical ceiling tile applied with identical adhesives to substrates according to test method indicated below by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Surface-Burning Characteristics:
 - 1) Ceiling tile shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
 - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
 - b) Flash point: None.
 - 2. Passage of 'Room-Corner Test' as recognized by AHJ, is required for system. Adhesive cited in test literature is required for installation of ceiling tile on Project.
 - a. Room Corner Tests:
 - 1) ASTM E84, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
 - 2) IBC 803.2.1, 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
 - 3) NFPA 265: 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
 - 4) UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'.

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 materials where protected from moisture, direct sunlight, surface contamination, and damage.
2. Store in cool, dry location, out of direct sunlight and weather, and at temperatures between 32 deg F and 86 deg F
3. Handle acoustical ceiling panels carefully to avoid chipping edges or damage. Use no soiled, scratched, or broken material in the Work.

1.5 FIELD CONDITIONS**A. Ambient Conditions:**

1. Building shall be enclosed, mechanical system operating with proper filters in place, and temperature and humidity conditions stabilized within limits under which Project will operate before, during, and after installation until Substantial Completion.
2. Installation shall be at temperatures between 32 deg F and 86 deg F or as per Manufacturer recommendations.

1.6 WARRANTY**A. Manufacturer's Warranty:**

1. Acoustical ceiling panels:
 - a. Manufacturer's warranty to be free from defects in materials and factory workmanship.
 - b. Manufacturer's warranty against sagging and warping.
 - c. Manufacturer's warranty against mold/mildew, and bacterial growth.

PART 2 - PRODUCTS**2.1 MANUFACTURERS****A. Manufacturers Contact List:**

1. Armstrong World Industries, Lancaster, PA www.ceiling.com.
 - a. Contact Information:
 - 1) For pricing and ordering of tile, contact Sherry Brunt / Phyllis Miller at (800) 442-4212, FAX 800-233-5598, or bpo_strategic_accounts@armstrong.com.
 - 2) For Strategic Account information, contact Randy Lay at (303) 775-1409 ralay@armstrong.com.
2. USG Interiors Inc, Chicago, IL www.usg.com.

2.2 MATERIALS**A. Acoustic Ceiling Panels:**

1. Description:
 - a. Color: White (surface factory-applied).
 - b. Composition: Water-felted mineral panels or cast mineral fiber.
2. Design Criteria:
 - a. Acoustics:
 - 1) Noise Reduction Coefficient (NRC): ASTM C423; 0.70 minimum.
 - 2) Ceiling Attenuation Class (CAC): ASTM E1414/E1414M; 35 minimum.
 - b. Antimicrobial Protection: Resistance against growth of mold/mildew.
 - c. Classification:
 - 1) Meet requirements of ASTM E1264, Type III (mineral base with painted finish), Form 1 (nodular) or Form 4 (cast or molded), Pattern E1 (lightly textured).
 - d. Fire Performance: As specified in Quality Assurance in Part 1 of this specification.
 - e. Light Reflectance (LR): ASTM E1477; 0.84 minimum.
 - f. Sag Resistance: Resistance to sagging in high humidity conditions.
 - g. VOC: Low.
3. Wide Face Design:
 - a. Design Criteria:
 - 1) Grid Face: 15/16 inch.
 - 2) Size: 24 inch x 24 inch x 7/8".
 - b. Type One Acceptable Products. See Section 01 6200:
 - 1) Fine Fissured item 1713 by Armstrong:
 - a) Grid System: Prelude XL Exposed Tee.
 - b) Edge Profile: Square Lay-in.
 - 2) Radar ClimaPlus Open Plan item 22320 by USG:
 - a) Grid System: DX/DXL Exposed Tee.
 - b) Edge Profile: Square.
 - 3) Equal as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verification Of Conditions:
 - 1. Inspect for defects in support that are not acceptable.
 - a. All wet work (concrete, painting, and etc.) must be completed and dry.
 - b. Temperature conditions within Manufacturer's written recommendation.
 - 2. Notify Architect of unsuitable conditions in writing.
 - a. Do not install acoustical ceiling panels until defects in support or environmental conditions are corrected.

3.2 PREPARATION

- A. Materials shall be dry and clean at time of application.
- B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

- A. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.
- B. Special Techniques:
 - 1. If recommended by Manufacturer, use tile one at a time from at least four (4) open boxes to avoid creating any pattern due to slight variations from box to box. Use tile from same color run in individual rooms to assure color match.
 - 2. Leave tile in true plane with straight, even joints.

3.4 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
 - 1. Remove and replace defective materials at no additional cost to Owner including, but not limited to following:
 - a. Remove and replace damaged or broken acoustical ceiling panels.
 - b. Remove and replace discolored acoustical ceiling panels to match adjacent.
 - c. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.5 CLEANING

- A. Clean exposed surfaces of acoustical ceiling panels, including trim, edge moldings, and suspension members.
 - 1. Comply with Manufacturer's written instructions for cleaning and touch up of minor finish damage.
- B. Waste Management:
 - 1. Remove from site all debris connected with work of this Section.

END OF SECTION

SECTION 09 5323
METAL ACOUSTICAL SUSPENSION ASSEMBLIES

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install metal acoustical suspension system as described in Contract Documents including:
 - a. Suspension system framing.
 - b. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.
- B. Related Requirements:
 - 1. Section 09 5113: 'Acoustical Panel Ceiling'.
 - 2. Section 26 5100: 'Interior Lighting' for electrical fixtures installed in ceiling.
 - 3. Division 21: 'Fire Suppression' for sprinklers installed in ceiling.
 - 4. Division 23: 'Mechanical' for related sections for HVAC installed in ceiling.
 - 5. Division 26: 'Electrical' for related electrical work.
 - 6. Division 27: 'Communications' for related sound and video work.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate layout of suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, and fire-suppression systems.
 - 2. All work above ceiling should be completed prior to installing suspended system. There should be no materials resting against or wrapped around suspension system, hanger wires or ties.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Provide Manufacturer's technical literature on suspension system including listing dimensions, load carrying capacity and standard compliance.
 - 2. Samples:
 - a. Minimum 8 inch long samples of exposed wall molding and suspension system, including main runner/tee and cross runner/tee with couplings.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.
 - b. Installer's certificates of training.
 - 2. Manufacturer's Instructions:
 - a. Manufacturer's details and installation instructions for seismic bracing. If requested, provide copy of code requirements applicable to Project.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. All system components conform to ASTM standards.
 - 2. Fire-Resistance Rating: UL approved metal suspension system.
 - 3. Meet seismic bracing requirements of ASCE 7, ASTM C635/C635M and ASTM C636/C636M or equivalent governing standard for project site.
 - 4. Seismic Standard: Acoustical ceilings shall be designed and installed to withstand the effects of earthquake motions according to the following:
 - a. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E580/E580M.
 - b. Cisca's Recommendations for Acoustical Ceilings: Comply with Cisca's '*Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings-Seismic Zones 0-2*' (Apply to Seismic Categories A & B).
 - c. Cisca's Guidelines for Systems Requiring Seismic Restraint: Comply with Cisca's '*Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies-Seismic Zones 3 & 4*' (Apply to Seismic Categories C, D, E & F).
- B. Qualifications. Requirements of Section 01 4301 applies, but not limited to following:
 - 1. Installer:
 - a. Installer training (Ceiling Masters training course or equivalent).
 - 2. Manufacturer:
 - a. Manufacturer in good standing of Cisca (Ceiling and Interior Systems Construction Association).

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
 - 1. Materials shall be delivered in original, unopened packages with labels intact.
 - 2. Store material in fully enclosed space protected against damage from moisture, direct sunlight, surface contamination, and general damage.

1.6 WARRANTY

- A. Manufacturer Warranty:
 - 1. Suspension system: Manufacturer warranty including repair or replacement of rusting as defined by ASTM D610 and defects in material or factory workmanship.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Type One Acceptable Manufacturers:
 - a. Grid Face: 15/16 inch:
 - 1) Armstrong World Industries Co, Lancaster, PA www.armstrong.com.
 - 2) USG Interiors Inc, Chicago, IL www.usg.com.
 - 3) Equal as approved by Architect before bidding. See Section 01 6200.
- B. Materials:
 - 1. Grid:
 - a. Systems shall meet requirements of ASTM C635/C635M, Heavy Duty suspension system required for Seismic Design Categories D, E, or F.
 - b. Exposed surfaces shall be finished with factory-applied white baked enamel.
 - c. Meet requirements of ASTM D610 for red rust.
 - d. Main runners and cross tees:
 - 1) All main beams and cross tees shall be commercial quality hot-dipped galvanized (galvanized steel, aluminum, or stainless steel) as per ASTM A653/A653M. Main beams and cross tees are double-web steel construction with type exposed flange design.
 - 2) Wide-face design - main runners and cross tees shall have one inch (exposed face).
 - 2. Performance Standards:
 - a. DXL Systems by USG Interiors required for Seismic Design Categories D, E, or F.
 - 3. Wire Hangers, Braces, and Ties:
 - a. Zinc-Coated, carbon-steel wire meeting requirements of ASTM A641/A641M, Class 1 zinc coating, soft temper.
 - b. Size:
 - 1) Standard size: 12 gauge (0.105 inch) galvanized, soft annealed steel wire.
 - 2) Select wire diameter so its stress is less than yield when loaded at three (3) times hanger design load (ASTM C635/C635M), Table 1, 'Direct Hung') will be less than yield stress of wire, but provide not less than 12 gauge (0.105 inch).
 - c. Protect with rust inhibitive paint.
 - 4. Wall Molding: Channel section of cold-rolled electro-galvanized steel.
 - 5. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of same width as exposed runner.
 - 6. Hold-down Clips: As required by UL to prevent lifting of panels under unusual draft conditions.
 - 7. Seismic Joint Clip:
 - a. Required for Seismic Design Categories D, E, or F.
 - b. Quality Standard Product:
 - 1) SJCG by Armstrong World Industries, Lancaster, PA www.armstrong.com.
 - 2) Equal as approved by Architect before bidding. See Section 01 6200.
 - 8. Seismic Suspension System:
 - a. Required for Seismic Design Categories A, B, C, D, E, or F:
 - b. Design Criteria:
 - 1) Installation of ceiling system must be as prescribed by ICC-ES Evaluation Reports ESR-1222 or ESR-1308 and applicable code.
 - 2) Meet requirements of ASTM A568/A568M for hot-dipped galvanized, cold-rolled steel.
 - 3) Attach cross runners to wall with seismic clips.

- c. Wall Molding Size: 7/8 inch for all seismic design categories (code approved)
- d. Category Four Acceptable Products. See Section 01 6200 for definition of Categories.
 - 1) ACM7 Clip by USG Inc, Chicago, IL www.usg.com.
 - 2) BERC-2 Clip by Armstrong World Industries, Lancaster, PA www.ceilings.com.
- 9. Compression Posts/Struts:
 - a. Required for Seismic Design Categories D, E, or F.
 - b. Meet seismic requirements for Project.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
 - 1. Inspect area receiving suspension system to identify conditions which will adversely affect installation.
 - a. Work trades work to be thoroughly dry and complete prior to installation.
 - b. Verify weather tightness of area to receive suspension system prior to installation.
 - 2. Notify Architect of unsuitable conditions in writing.
 - a. Do not install ceiling panels until adverse conditions have been remedied.

3.2 INSTALLATION

- A. Interface With Other Work:
 - 1. All work above ceiling should be completed prior to installing suspended ceiling system including related work including: drywall furring work, acoustical tile, light fixtures, mechanical systems, electrical systems, and sprinklers.
- B. General:
 - 1. Install suspension system and panels in accordance with Manufacturer's written instructions, and in compliance with ASTM C636/C636M, and with authorities having jurisdiction (AHJ).
- C. Lay out suspension system symmetrically about center lines of room unless shown otherwise by Contract Drawings. Lay out system so use of tiles less than 1/2 size is minimized.
- D. Suspend main runner/tee from overhead construction with hanger wires spaced 4 feet on center along length of main runner/tee. Install hanger wires plumb and straight. Hanger wires shall not be installed in convenience holes.
- E. Maintain suspension system in true plane with straight, even joints.
- F. Suspension system joints shall be straight and in alignment, and exposed surface flush and level. Wherever system abuts walls, columns, and other vertical surfaces, furnish and install appropriate molding.
- G. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
- H. Support edges with wall moldings.
- I. Locate light fixtures, speakers, and mechanical diffusers and grilles symmetrically in room insofar as possible (unless shown otherwise). Locate fixtures, speakers, diffusers, and grilles within suspension grid spaces and centered at least one (1) direction within grid. Installed fixtures shall not compromise ceiling performance.
- J. Pay particular attention to required hanger wire placement and fixture protection. Individual component deflection not to exceed 1/360 of span.
- K. Nails installed vertically into bottom of structural members, which are subject to pullout, shall not be used to support metal acoustical suspended assemblies:
 - 1. Nails may be used when installed horizontally into sides of structural members.
 - 2. Embedment must be at least 5/8 inch.
 - 3. Screws, eyebolts or lag bolts used to support metal acoustical suspended assemblies must have minimum embedment of 5/8 inch when installed into structural members.

3.3 FIELD QUALITY CONTROL

- A. Field Inspections:
 - 1. Inspect:
 - a. Suspended ceiling system.
 - b. Hangers, anchors and fasteners.
- B. Non-Conforming Work:
 - 1. Correct any work found defective or not complying with contract document requirements at no additional cost to Owner.

END OF SECTION

**SECTION 09 6513
RESILIENT BASE AND ACCESSORIES**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But not Installed Under this Section:
 - 1. Resilient base as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary': for resilient base and accessories excluded from Contract and furnished and Installed by Owner. This Section establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.
 - 2. Section 09 6519: 'Resilient Tile Flooring' for installation of resilient base and accessories.

1.2 REFERENCES

- A. Definitions:
 - 1. Flame Spread: 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.
 - 3. Resilient Wall Base Classification:
 - a. Type:
 - 1) TS: Rubber, vulcanized thermoset.
 - 2) TP: Rubber, thermoplastic.
 - 3) TV: Vinyl, thermoplastic.
 - b. Group:
 - 1) Group 1: Solid (homogeneous).
 - 2) Group 2: Layered (multiple layers).
 - c. Styles:
 - 1) Style A: Straight.
 - 2) Style B: Cove.
 - 3) Style C: Butt-to.
 - 4. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
 - b. ASTM F1861-16, 'Standard Specification for Resilient Wall Base'.
 - 2. Underwriters Laboratories, Inc.:
 - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (2010 - Tenth Edition).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate completion of resilient base and accessories installation with other trades.
- B. Pre-Installation Conference:
 - 1. Participate in pre-installation conference as specified in Section 09 0503 and held jointly with Section 09 6813 and Section 09 6816 pre-installation conference.
 - 2. In addition to agenda items specified in Section 01 3100 and Section 09 0503, review following:
 - a. Review if stairs are included for Project.
 - b. Review if stair skirts are included for Project.

1.4 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature or cut sheet on base and adhesive.
 - b. Color selection.

1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Fire-Test-Response Characteristics:
 - a. Surface-Burning Characteristics:
 - 1) Base shall have Class B flame spread rating in accordance with ASTM E84 or UL 723.

1.6 DELIVERY, STORAGE, AND HANDLING

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

B. Storage And Handling Requirements:

1. Store materials in dry space protected from weather at not less than 55 deg F or more than 85 deg F or as per Manufacturer's recommendation.
2. Reject material from containers that have been distorted, damaged or opened prior to installation.

1.7 FIELD CONDITIONS**A. Ambient Conditions:**

1. Store materials at not less than 70 deg F for at least twenty four (24) hours before installation.
2. Do not apply in temperatures below 70 deg F.

PART 2 - PRODUCTS**2.1 OWNER-FURNISHED PRODUCTS****A. Manufacturers:**

1. Manufacturers Contact List:
 - a. Roppe Corporation, Fostoria, Fostoria, OH www.roppe.com.

B. Materials:

1. Wall Base:
 - a. General:
 - 1) Size:
 - a) Minimum body thickness: 1/8 inch by 4 inch Length: not less than normal.
 - b) Corners:
 - c) Use preformed, molded external corners for both inside and outside corners.
 - d) Butt joint interior corners.
 - e) Corners must meet same height and thickness requirements as wall base.
 - b. Design Criteria:
 - 1) Meet requirements of ASTM F1861, Type TP or TS, Group 1 (solid), Style B (cove).
 - 2) Free from objectionable odors, blisters, cracks, and other defects affecting appearance or serviceability of rubber, and not containing fabric.
 - 3) Style: Cove.
 - c. Approved Colors:
 - 1) General:
 - a) Color pigments used shall be highly fade-resistant, insoluble in water, and resistant to light, alkali, and cleaning agents.
 - 2) Wall Base (all areas unless otherwise noted):
 - a) Dark Gray by Roppe.
 - d. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Rubber Wall Base by Roppe.
2. Adhesive:
 - a. Use products recommended by Manufacturer for conditions of use.

PART 3 - EXECUTION**3.1 APPROVED INSTALLER****A. Category Four Approved Installer. See Section 01 6200 for definitions of Categories:**

1. Flooring Services Inc., Sandy, UT www.flooringservices.com.
 - a. Contact Marie Davis, LDS Account Manager, office (801) 487-3600, cell (801) 631-9152 email marie@flooringservices.com.
2. Same Installer for Section 09 6519 shall install Section 09 6513.

3.2 EXAMINATION**A. Verification Of Conditions:**

1. Inspect surfaces for conditions not suitable for installation. Surface to receive specified items shall be sound, clean, free from foreign matter, tightly nailed, and dry.
2. Notify Architect of unsuitable conditions in writing:
 - a. Do not start work until defects are corrected.
3. Commencement of Work by installer is considered acceptance of substrate.

3.3 PREPARATION**A. Surface Preparation:**

1. Remedy cracks and minor irregularities in substrate in accordance with Manufacturer's recommendations.

3.4 INSTALLATION**A. Base:**

1. Install in manner to produce smooth, even finished surfaces tightly jointed and accurately aligned.
2. Fit specified items tightly. Use fillers where necessary. Fit neatly against projections, piping, electrical service outlets, etc.

3. Secure specified items with specified adhesive. Cement substantially to vertical surfaces including rubber base to cabinet work base.
4. Line up top and bottom lines of base throughout.
5. Do not stretch base during installation.
6. Roll until firm bond has been established. Leave level, free from buckles, cracks, and projecting edges.
7. In wall runs longer than 12 inches, install no lengths of base shorter than 12 inches long.

3.5 FIELD QUALITY CONTROL**A. Non-Conforming Work:**

1. Replace damaged materials at no additional cost to Owner.
2. Damaged materials are defined as having cuts, gouges, scrapes or tears, and not fully adhered.

3.6 CLEANING**A. General:**

1. Base:
 - a. Clean all exposed surfaces of base of adhesive spatter before it sets in accordance with Manufacturer's cleaning instructions.
 - b. Damp-mop surfaces to remove marks and soil.
2. Adjacent Work:
 - a. Clean all exposed surfaces of adjoining areas of adhesive spatter before it sets.

3.7 PROTECTION**A. Base:**

1. Cover material until Substantial Completion.
2. Keep traffic away until adhesive has set.

END OF SECTION

**SECTION 09 6519
RESILIENT TILE FLOORING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Section Includes But Is Not Limited To:
 - 1. Coordination, sequencing, and scheduling of Owner-Furnished resilient tile flooring installation as described in contract documents.
 - a. Coordinate with Section 09 0503 for Testing Agency testing of Alkalinity and Concrete Moisture of concrete slab before Pre-Installation Conference.
 - b. Schedule Pre-Installation Conference.
 - c. Maintain Building Ambient Conditions including normal levels of humidity, lighting, heating, and air conditioning for acceptability for beginning floor preparation and carpet installation.
- B. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for:
 - a. Resilient tile flooring is excluded from Contract and provided by Owner. This specification establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.
 - b. Alkalinity and Concrete Moisture of concrete slab.
 - 2. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - 3. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 4. Section 09 0503: 'Floor Substrate Preparation'.
- C. Products Installed But not Furnished Under this Section:
 - 1. Owner furnished Resilient Base and accessories as described in Contract Documents.
- D. Related Requirements:
 - 1. Section: 09 6513: 'Resilient Base And Accessories' for furnishing of Resilient Base.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate completion of flooring installation with other trades.
- B. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference specified in Section 09 0503 and may be held jointly with other flooring systems included in project.
 - 2. Schedule conference after substrate preparation and ONE (1) week minimum before installation of flooring system.
 - 3. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review Testing Agency testing report of Alkalinity and Concrete Moisture of concrete slab.
 - 1) Follow Testing Agency report regarding Alkalinity and Concrete Moisture of concrete slab as specified in Section 09 0503 'Floor Substrate Preparation'.
 - 4. Review schedule for installation of resilient tile flooring and coordination with other trades.
 - 5. Review Flooring Manufacturer's installation conditions verification procedure and requirements.
 - 6. Review Building Ambient Conditions including normal levels of humidity, lighting, heating, and air conditioning for acceptability for beginning floor preparation and flooring installation.
 - 7. Review high moisture remediation options when high moisture exists based on moisture testing specified in Section 09 0503 'Flooring Substrate Preparation'.
- C. Sequencing:
 - 1. Testing Agency to provide testing for Alkalinity and Concrete Moisture as specified in Section 09 0503 'Floor Substrate Preparation' before Pre-Installation Conference.
 - 2. Manufacturer's remediation of high moisture concrete before installation of Resilient Tile Flooring.
 - 3. Installation of Resilient Tile and Resilient Base.
- D. Scheduling:
 - 1. Testing Agency to provide testing for Alkalinity and Concrete Moisture of concrete slab as specified in Section 09 0503 'Floor Substrate Preparation'.
 - 2. Notify Flooring Installer when Building Ambient Conditions requirements are met before installation of flooring system.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature or cut sheet on each component of system.
 - b. Maintenance instructions.
 - c. Color and style selection.

- B. 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.
 - b) Color and style selection.
 - 2) Testing and Inspection Reports:
 - a) Testing Agency Testing Reports of Alkalinity and Concrete Moisture testing.
- C. Maintenance Material Submittals:
 - 1. Extra Stock Materials:
 - a. Leave box of twenty (20) extra tile of each pattern and color used on Project with Owner.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Deliver materials in undamaged and unopened packaging or containers with Manufacturer's labels intact.
- B. Storage And Handling Requirements:
 - 1. Resilient Tile Flooring and Adhesive:
 - a. Product Acclimation:
 - 1) Materials should be present at jobsite for at least forty-eight (48) hours prior to installation with ambient temperature between 65 deg F to 85 deg F, or as may otherwise be recommended by Manufacturer.

1.5 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Building Conditions:
 - a. Conditions inside building shall be brought to levels to be normal at occupancy of building.
 - b. Conditions include normal levels of humidity, lighting, heating, and air conditioning.
 - 2. Concrete Slab:
 - a. General:
 - 1) Final determination as to whether or not, concrete slab is dry enough for flooring installation should be based on evaluating both Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) testing as specified in Section 09 0503 'Floor Substrate Preparation'.
 - b. Alkalinity:
 - 1) Do not install flooring if alkalinity of concrete surface exceeds pH level 9. Corrective procedures are required.
 - c. Concrete Moisture Vapor Emission Rate (MVER):
 - 1) Testing conditions inside building shall be brought to same ambient temperature and relative humidity levels to be normal at occupancy of building. Conditions include normal levels of humidity, lighting, heating, and air conditioning.
 - 2) Follow requirements specified in Section 09 0503 'Floor Substrate Preparation' before installation of resilient tile flooring.
 - 3. Application:
 - a. Maintain 65 deg F 85 deg F during installation or as recommended by Manufacturer.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED PRODUCTS

- A. Manufacturer:
 - 1. Category Four Approved Manufacture. See Section 01 6200 for definitions of Categories.
 - a. Tandus Centiva., Dalton, GA www.tandus-centiva.com.
- B. Materials:
 - 1. Luxury Vinyl Tile (LVT):
 - a. Design Criteria:
 - 1) Classification: ASTM F1700 Class III Type B.
 - 2) Total Thickness: 0.120 inch.
 - 3) Edge Treatment: Square (SE).
 - 4) Meet Indoor Air Quality standards.
 - 5) Size: 18 inch x 18 inch Twenty-year Limited Commercial Wear Warranty.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Contour Series:
 - a) Classic Stone #ECL: Color Style: Ash Limestone #7107.
 - b) Montage #CMT: Color Style: Red Oxide #7424.

2. Adhesives:
 - a. Testing Results as testing for Alkalinity and Concrete Slab Moisture in Section 09 0503 is ninety (90) percent RH or less:
 - 1) Manufacture approved adhesive
 - b. Testing Results as testing for Alkalinity and Concrete Slab Moisture in Section 09 0503 is ninety (90) percent RH or more:
 - 1) RollSmart Adhesive must be used.
3. Floor Finish:
 - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Carefree Matte Low Gloss Floor Finish by Sealed Air Diversey Care, Sturtevant, WI www.sealedair.com/diversey-care/diversey-care-products/carefree-matte-floor-finish.
 - 2) XL Matte Floor Finish by XL North, Fall River, MA www.xlnorth.com.

PART 3 - EXECUTION

3.1 APPROVED INSTALLER

- A. Category Four Approved Installer. See Section 01 6200 for definitions of Categories:
 1. Flooring Services Inc., Sandy, UT www.flooringservices.com.
 - a. First Contact: Jason Rowley, LDS Account Manager, office (801) 487-3600 x 108, cell (801) 631-8382 email jason@flooringservices.com.
 - b. Second Contact: Marie Davis, LDS Account Manager, office (801) 487-3600, cell (801) 631-9152 email marie@flooringservices.com.

3.2 EXAMINATION

- A. Verification of Conditions:
 1. Resilient Tile Flooring:
 - a. Verify concrete surfaces are sufficiently cured and moisture content is within acceptable levels before beginning installation.
 - b. Verify ventilation requirements as specified in Field Conditions in Part 1 of this specification have been maintained before proceeding with applying flooring.
 2. Resilient Base And Accessories:
 - a. Inspect surfaces for conditions not suitable for installation. Surface to receive specified items shall be sound, clean, free from foreign matter, tightly nailed, and dry.
 - b. Notify Architect of unsuitable conditions in writing:
 - 1) Do not start work until defects are corrected.
 - c. Commencement of Work by installer is considered acceptance of substrate.

3.3 PREPARATION

- A. Surface Preparation:
 1. Resilient Tile Flooring:
 - a. Floor substrate prepared as specified in Section 09 0503.
 - b. Moisture vapor emission tests and alkalinity test of concrete slab has been performed.
 - c. Remedy cracks and minor irregularities in substrate in accordance with Manufacturer's recommendations.

3.4 INSTALLATION

- A. Resilient Tile Flooring:
 1. Lay tile symmetrically about center line of spaces to insure even borders, unless shown differently on Contract Drawings.
 2. Installation Method:
 - a. Lay tile quarter-turned.
 - b. Shuffling:
 - 1) Shuffling tiles from same carton.
 - 2) Shuffling tiles from multiple cartons.
 3. Adhesive:
 - a. High moisture vapor emission testing results:
 - 1) RollSmart Adhesive is required. Apply Adhesive as per Manufacturer's written instructions.
 4. Floor Finish:
 - a. Follow Manufacturers written instructions for floor preparation and application.
- B. Resilient Base And Accessories:
 1. Install in manner to produce smooth, even finished surfaces tightly jointed and accurately aligned.
 2. Fit specified items tightly. Use fillers where necessary. Fit neatly against projections, piping, electrical service outlets, etc.

3. Secure specified items with specified adhesive. Cement substantially to vertical surfaces including rubber base to cabinet work base.
4. Line up top and bottom lines of base throughout.
5. Do not stretch base during installation.
6. Roll until firm bond has been established. Leave level, free from buckles, cracks, and projecting edges.
7. In wall runs longer than 12 inches, install no lengths of base shorter than 12 inches long.

3.5 FIELD QUALITY CONTROL

A. Field Tests:

1. Resilient Tile Flooring:
 - a. See Section 09 0503 'Flooring Substrate Preparation' for Field Testing for Alkalinity and Concrete Moisture of concrete slab.

B. Non-Conforming Work:

1. Replace damaged materials at no additional cost to Owner.
2. Damaged materials are defined as having cuts, gouges, scrapes or tears, and not fully adhered.

3.6 ADJUSTING

A. Resilient Base And Accessories:

1. Inspect and make necessary adjustments within one (1) month after mechanical heat or other heat has been supplied continuously in finished areas.

3.7 CLEANING

A. General:

1. Adjacent Work:
 - a. Clean all exposed surfaces of adjoining areas of adhesive spatter before it sets.

B. Resilient Tile Flooring:

1. Adhesive:
 - a. Any excess adhesive must be removed from tile surface.
 - b. Do not allow epoxy adhesive to dry on tile surface.

C. Resilient Base And Accessories:

1. Clean all exposed surfaces of base of adhesive spatter before it sets in accordance with Manufacturer's cleaning instructions.
2. Damp-mop surfaces to remove marks and soil.

3.1 PROTECTION

A. Resilient Tile Flooring:

1. Keep installation from heavy foot traffic or rolling loads for at least twenty-four (24) hours.
2. Do not wash or apply finish to floor for minimum of forty-eight (48) hours after installation.

B. Resilient Base And Accessories:

1. Cover material.
2. Keep traffic away until adhesive has set.

END OF SECTION

SECTION 09 6816
SHEET CARPETING: Back Cushion, Direct Glue

PART 1 - GENERAL**1.1 SUMMARY**

- A. Section Includes But Is Not Limited To:
 - 1. Coordination, sequencing, and scheduling installation of Owner-Furnished carpet, carpet base, carpet accessories, leveling compounds as described in Documents and including following:
 - a. Maintain Building Ambient Conditions including normal levels of humidity, lighting, heating, and air conditioning for acceptability for beginning floor preparation and carpet installation.
 - b. Protection of carpet after installation of carpeting as required.
- B. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for carpet and carpet base excluded from Contract and furnished and installed by Owner. This Section establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.
 - 2. Section 03 3111: 'Cast-In-Place Structural Concrete' for provision of acceptable concrete substrate.
 - 3. Section 09 0503: 'Flooring Substrate Preparation' for:
 - a. Floor substrate preparation.
 - b. Pre-installation conference for Sections under 09 6000 heading 'Flooring.
 - 4. Section 09 6513: 'Resilient Base And Accessories' for resilient base.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate completion of carpet installation with other trades.
- B. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference as specified in Section 09 0503.
 - 2. Schedule pre-installation conference before installation of flooring system.
 - 3. Conference may be held at project site or another convenient site. Participants may also attend by video or audio conference if approved by Project Manager.
 - 4. Schedule conference after substrate preparation and ONE (1) week before installation of flooring.
 - 5. In addition to agenda items specified Section 01 3100 and Section 09 0503, review following:
 - a. Review Owner's Representative schedule for furnishing and installation carpet.
 - b. Review Flooring Manufacturer's installation conditions verification procedure and requirements.
 - c. Review Building Ambient Conditions including normal levels of humidity, lighting, heating, and air conditioning for acceptability for beginning floor preparation and carpet installation.
 - d. Review cleaning and disposal requirements.
 - e. Review protection requirements of carpet after installation of carpeting.
- C. Scheduling:
 - 1. Notify Flooring Installer when Building Ambient Conditions requirements are met before installation of flooring system.
 - 2. Notify Owner's Representative to coordinate installation of carpet.

1.3 SUBMITTALS

- A. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation:
 - 1) Copy of Warranty.
 - b. Record Documentation:
 - 1) Owner will provide Project Carpet Request Documentation forms in both hard copy and digital format:
 - a) Carpet Request Information Sheet.
 - b) Carpet Vendor Quotation.
 - c) Carpet Preinstallation Meeting Agenda.
 - d) Carpet Installation Notice to Proceed or Cancel.
 - e) Carpet Inspection and Completion.
 - f) Carpet Overage Report and Completion.
 - g) Carpet Quotation Change Request.
- B. Maintenance Material Submittals:
 - 1. Extra Stock Materials:
 - a. Leave piece of carpet consisting of 12 sq yds, and 25 lineal feet minimum of carpet base.
 - b. Roll up and tie securely.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. All products provided will meet requirements of all federal, state, and local codes having jurisdiction.
 - 2. Label meeting Federal Labeling Requirements, as stated in Textile Products Identification Act under Federal Trade Commission, shall be attached to certification samples and products delivered.
- B. Qualifications: Section 01 4301 applies, but is not limited to following:
 - 1. Carpet Installer Qualifications:
 - a. Certified CFI Master or Contract II grade installer or FCIB certified.
 - b. Not less than five (5) years of experience in installation of commercial carpet tile of type, quantity and installation methods similar to work of this section.
 - c. Qualified and approved by Carpet Manufacturer.
 - 2. Carpet Manufacturer Qualifications:
 - a. Not less than five (5) years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section.
 - b. VMR Approved Carpet Manufacturers:
 - 1) Approval subject to VMR agreement process approval.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. General:
 - 1. Comply with instructions and recommendations of Manufacturer for special delivery, storage, and handling requirements.
- B. Delivery And Acceptance Requirements:
 - 1. Deliver materials and accessories necessary for completion of carpet installation to site before beginning installation of carpet.
 - 2. Do not deliver materials before date scheduled for installation.
 - 3. Transport carpet in manner that prevents damage and distortion. Bending or folding individual carpet rolls or cuts from rolls is not recommended. When bending or folding is unavoidable for delivery purposes, carpet is required to be unrolled and allowed to lie flat immediately upon arrival at installation site.
- C. Storage And Handling Requirements:
 - 1. Store carpet and related materials in a climate-controlled, dry space.
 - 2. Protect carpet from soil, dust, moisture and other contaminants and store on a flat surface.
 - 3. Stacking heavy objects on top of carpet rolls or stacking more than three rolls is prohibited.

1.6 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Building Conditions:
 - a. Conditions inside building shall be brought to levels to be normal at occupancy of building. Conditions include normal levels of humidity, lighting, heating, and air conditioning. (HVAC must be in operation thru out carpet installation):
 - 1) Carpet installation is not to begin until HVAC system is operational and following conditions are maintained for at least forty-eight (48) hours before, during and seventy-two (72) hours after completion:
 - a) Carpet is to be installed when indoor temperature is between 65° - 95° F with maximum relative humidity of 65%.
 - b) Substrate surface temperature should not be less than 65° F at time of installation.
 - c) Do not allow temperature of indoor carpeted areas to fall below 50° F, regardless of age of installation.
 - 2) Maintain fresh air ventilation after installation for seventy-two (72) hours minimum or until lingering odors are gone.
 - 2. Concrete Slab:
 - a. Sufficiently cured and dry to bond with adhesive.

1.7 WARRANTY

- A. Manufacturer Warranty:
 - 1. Provide Carpet Manufacturer's standard Warranty which includes following:
 - a. Warranty shall cover defects in installation, workmanship, and installation materials.
 - b. Warranty includes specific workmanship warranties for delamination, edge raveling, fuzzing, pilling, and other textural changes which can be controlled through proper manufacturing (no fraying, zippering, delamination, edge raveling, fuzzing, pilling in carpet is acceptable for any reason).

- c. Warranty terms will include inspection of defective area within fifteen (15) days of receipt of written notice from Owner and completion of corrective work within forty-five (45) days, unless other arrangements are made in writing with Owner on case-by-case basis.
- d. Carpet defect or installation defect:
 - 1) Carpet Manufacturer may use any reasonable means to cure first three (3) breaches of warranty affecting an area of carpeting bounded by natural breaks such as doorways, ('affected carpet area'). Such cure must preserve as uniform a blended appearance, acceptable to Carpet Manufacturer and Owner, as exists throughout Installation Site at time of breach.
 - 2) If carpet defect or installation defect continues to appear after three (3) separate notices for correction from Owner, replace carpet where defects have occurred.
- e. If Carpet Manufacturer follows installation requirements of Section 09 0503 'Floor Substrate Preparation' Carpet Manufacture accepts liability of carpet installation for said given time as outlined in Special Warranty regardless of any climate or condition changes affecting RH levels of floor substrate.
- 2. Special Warranty:
 - a. Sheet Carpeting:
 - 1) General:
 - a) Appearance Retention to be provided with Special Warranty requirements if not already included in Standard Warranty.
 - 2) Bishop's Storehouse, Deseret Industries:
 - a) Office Areas:
 - (1) Owner Carpet Program Product: Provide fifteen (15) year minimum or Carpet Manufacturer's better Warranty on carpet system.
 - b) Retail Space:
 - (1) Owner Carpet Program Product: Provide ten (10) year minimum or Carpet Manufacturer's better Warranty on carpet system.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED PRODUCTS

- A. Category One VMR Manufacturers. See Section 01 6200 for definitions of Categories:
 - 1. Materials supplied for carpet installation shall be complete package from specified Carpet Manufacturer:
 - a. Tandus Centiva., Dalton, GA www.tandus-centiva.com.
 - 1) Contact Information: Tracy Riddle - cell (801) 580-5147 fax (866) 861-7522
Tracy.Riddle@Tarkett.com.
- B. Materials:
 - 1. Carpet:
 - a. Category Four Approved Manufacturer and Color / Patterns. See Section 01 6200 for definitions of Categories:
 - 1) Tandus Centiva: Style: 04346 Ensign II, Color: DI 86172.
 - 2. Carpet Base:
 - a. 4-1/2 inch wide base without cushion backing:
 - 1) Top edge of base serged with 1-1/4 inch polyester binding fabric.
 - 2) Roll edges of binding fabric under and sew along top edge of carpet cove base.
 - b. Category Four Approved Manufacturer, Style, and Color. See Section 01 6200 for definitions of Categories:
 - 1) Tandus Centiva: Style 04346 Ensign II, Color: DI 86172.

2.2 ACCESSORIES

- A. Carpet Accessories: Snap-in vinyl reducer strips and vinyl track.
- B. Floor Leveling Compound, Floor Patching Compound, And Latex Underlayment: As recommended and approved by Carpet Manufacturer.

PART 3 - EXECUTION

3.1 APPROVED INSTALLER

- A. Category Four Approved Installer. See Section 01 6200 for definitions of Categories:
 - 1. Flooring Services Inc., Sandy, UT www.flooringservices.com.
 - a. Contact Marie Davis, LDS Account Manager, office (801) 487-3600, cell (801) 631-9152
email marie@flooringservices.com.

3.2 EXAMINATION

- A. Verification of Conditions:
 - 1. Verify required ambient conditions inside building for required normal levels of humidity, lighting, heating, and air conditioning have been maintained for at least forty-eight (48) hours before and during carpet installation and seventy-two (72) after installation of carpet.
- B. Evaluation And Assessment:
 - 1. Carpet Areas:
 - a. Variation In Grade:
 - 1) Plus or minus 1/8 inch in any 10 foot of floor slab and distance between high point and low point of slab of 1/2 inch .
 - b. Testing Procedure:
 - 1) Place ends of straightedge on 3/8 inch high shims.
 - 2) Floor is satisfactory if 1/4 inch diameter steel rod rolled under straightedge will not touch anywhere along 10 foot length and 1/2 inch diameter steel rod will not fit under straightedge anywhere along 10 foot length.
 - c. Notify Owner's Representative in writing if floor surface is not acceptable to install carpet:
 - 1) Do not lay carpet over unsuitable surface. Commencing installation constitutes acceptance of floor and approval of existing conditions.

3.3 PREPARATION

- A. Carpet Areas:
 - 1. Flooring Preparation:
 - a. Owner-Furnished Product Supplier's Responsibility:
 - 1) Prepare floor substrate in accordance with 'CRI Carpet Installation Standard' best practices to receive carpet installation and to provide installation that meets warranty requirements.
 - 2) Verify concrete surface cured, clean, dry, and free of foreign substances that will compromise carpet and/or installation.
 - b. Concrete floor slab patching:
 - 1) Cracks, chips and joints must be properly patched or repaired.
 - c. Concrete surface cured, clean, dry, and free of foreign substances that will compromise carpet and/or other flooring installations:
 - 1) Removal of curing compounds.
 - 2) Remove paint, sealer, grease, oil, silicone sealants, and other materials incompatible with flooring adhesives.
 - 3) Removal of overspray from painted walls (essential so glue will stick).
 - d. Vacuum and damp mop floor areas to receive flooring before flooring installation.
 - 2. Relaxing / Conditioning Carpet:
 - a. Highly recommended that carpet be unrolled and allowed to relax in installation area for time period that conforms to requirements of manufacturer of product being installed:
 - b. Protect carpet adequately from soil, dust, moisture and other contaminants.
 - c. Sundry items, such as adhesives, should also be conditioned.
 - 3. Carpet Accessories:
 - a. Owner-Furnished Product's Responsibility:
 - 1) Sundry items, such as adhesives, shall be conditioned to building ambient conditions before use.

3.4 INSTALLATION

- A. Carpet:
 - 1. General:
 - a. Install carpet and carpet base in accordance with 'CRI Carpet Installation Standard' and Manufacturer's written instructions supplied with product.
 - b. Adhesion of carpet cushion (or secondary backing) to floor substrate and adhesion of carpet primary and secondary backings shall be continuous on floor surface so there are no bubble, ridges, or any separation of carpet from backings or backing from floor substrate caused by failure of carpet, backings or cushion, and adhesives as a system.
 - c. Install carpet under edge of metal thresholds where possible. Use specified carpet accessories at exposed edges.
 - 2. Seaming Requirements:
 - a. Seal seams in accordance with Carpet Manufacturer's instructions and according to CRI Carpet Installation Standard (2009) as applicable. Seam carpet base only at inside corners.

- b. No seam separation in carpet and no more observable seams from any standing position than that which is unavoidable using best seaming materials and practices available at time of installation.
 - c. Lay rooms parallel to respective Corridors. Seam to permit best use of available carpet.
 - d. Quarter turning allowed only at cross-Corridors longer than 24 feet.
 - e. Use single or double seams at doorways (single seams preferred). Run nap of pieced carpet in same direction.
- B. Carpet Base:
- 1. Precut base so seams occur only at inside corners.
 - 2. Scribe base to floor.
 - 3. Spread adhesive over back side of base up to bottom of serging on edge or apply three 3/16 inch minimum diameter beads of adhesive placed one inch apart on back of base with top bead placed 2 inch down from serged edge of base and spread adhesive over back surface of base up to bottom edge of serging.
 - a. Bird's mouth finish should only be required when door frame is flush with wall.
 - b. If bird's mouth is required, terminate at door frames or vertical trim with 45 degree angle, bird mouth cut so serged edge turns down to contact frame or trim.
 - 4. Do not allow adhesive beyond edge of base. Remove excess adhesive.
 - 5. Do not use staples, nails, screws or other mechanical fasteners.

3.5 FIELD QUALITY CONTROL

- A. Field Inspections:
- 1. Carpeting:
 - a. Unacceptable carpet after installation shall include but not be limited to:
 - 1) Delaminating carpet from backings.
 - 2) Fiber loss less than specified.
 - 3) Edge raveling.
 - 4) Fuzzing of carpet fibers.
 - 5) Pilling of carpet fibers.
 - 6) Appearance retention less than control samples attached to Agreement.
 - 7) Dye bleeding.
 - 8) Zippering fibers in carpet.
 - 9) Color streaking.
 - 10) Irregular tufts of fiber.
 - b. Unacceptable workmanship shall include but not be limited to:
 - 1) Improper floor preparation before installation.
 - 2) Failure of adhesive to completely adhere carpet to floor resulting in bubbles, ridges, or ripples where carpet has separated from floor.
 - 3) Seams that do not comply with specified requirements:
 - a) Raveled or untrimmed seams.
 - b) Seams not sealed, level, straight, or even.
 - c) Open seams.
 - d) Seams visibly open when viewed by Project Manager from standing position.
 - 4) Sequence rolls, commercial match issues created by rolls being installed out of sequence will require correction or replacement.
 - 5) Failure to properly install carpet next to walls and door frames to eliminate gaps or puckering of carpet.
 - 6) Use of unspecified carpet.
 - 7) Carpet base ends not finished to terminate at door frames or vertical trim shall have 45 degree angle 'birdsmouth' finish.
 - 8) Adhesive exposed on carpet, on carpet base, beyond edges of carpet base, and on other surfaces of building.
 - 9) Carpet base that is not scribed to fit against floor with no gaps.
 - 10) Carpet base attached by means other than acceptable carpet base adhesive.
- B. Non-Conforming Work:
- 1. Carpeting:
 - a. Basis of Acceptable Carpeting: Source Quality Control Testing:
 - 1) Carpet products not meeting Design Criteria and Source Quality Control Testing of this specification will be considered unacceptable carpeting.

- b. Unacceptable Carpeting:
 - 1) Unacceptable carpeting will be rejected and shall be repaired or replaced at no additional cost to Owner. Owner's Representative will determine reasonable location of acceptable transition points for removal of unacceptable carpet. Minimum replacement size shall be:
 - a) Between nearest existing seams.
 - b) Between natural transition points or 12 feet of running length.

3.6 ADJUSTING

- A. Inspect and make necessary adjustments within one (1) month after mechanical heat or other heat has been supplied continuously in finished areas.

3.7 CLEANING

- A. General:
 - 1. Carpeting:
 - a. Carpet Installer's Responsibility:
 - 1) Remove any soiling and/or staining from carpet.
 - 2) Remove excessive adhesive with manufacturer recommended adhesive removers.
- B. Damage to building:
 - 1. Carpeting:
 - a. Carpet Installer's Responsibility:
 - 1) Carpet Installer responsible for cleaning and repair of all damaged surfaces to their original condition from carpet installation.
- C. Waste Management:
 - 1. Contractor's Responsibility:
 - a. Provide adequate waste receptacles (dumpsters) and dispose of Owner Furnished materials from building and property as specified in Section 01 7400.
 - 2. Carpet Installer's Responsibility:
 - a. All work areas are to be kept clean, clear and free of debris at all times.
 - b. Disposal of rubbish, wrapping paper, scraps, and trimmings in provided dumpster(s).

3.8 PROTECTION

- A. Protection of Carpeting:
 - 1. Contractor's Responsibility:
 - a. No traffic of any kind on newly installed carpet for minimum of twenty-four (24) hours after installation is completed.
 - b. No wheeled traffic of any kind placement of furniture or equipment on carpet for minimum of forty-eight (48) hours after completion of carpet installation.
 - c. Protect carpet adequately from soil, dust, moisture and other contaminants after carpet installation.
 - d. Protect carpet from abuse, vandalism, or damage occurring after installation is complete.

END OF SECTION

SECTION 09 7720
DECORATIVE FIBERGLASS REINFORCED WALL PANELS (FRP)

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install decorative fiberglass reinforced wall panels (FRP) and trim in custodian rooms as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 09 2900: 'Gypsum Board'.
 - 2. Section 09 6513: 'Resilient Base And Accessories' for base.
 - 3. Section 09 6816: 'Sheet Carpeting' for installation of resilient base and accessories.
 - 4. Section 22 4216: 'Commercial Lavatories And Sinks' for furnishing and installation of Wall Guards at service sink attached to FRP panels.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate completion of resilient base and accessories installation with other trades.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature or cut sheet for panel and adhesive.
 - b. Color and pattern selection.
 - 2. Sample:
 - a. Physical panel showing applied color selected.
 - b. Exposed molding and trim showing each type, finish, and color.
- B. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Provide written instructions for following:
 - 1) Storage and handling requirements and recommendations.
 - 2) Preparation and installation instructions.
 - 3) Cleaning and maintenance instructions.
 - 2. Qualification Statement:
 - a. Installer:
 - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Cleaning and maintenance instructions.
 - b. Warranty Documentation:
 - 1) Final, executed copy of Warranty.
 - c. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature or cut sheet.
 - b) Color and pattern selection.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Fire-Test-Response Characteristics:
 - a. Surface-Burning Characteristics:
 - 1) 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).

1.5 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. Follow Manufacturer's instructions and precautions for storage of materials.
 - 2. Store panels and trim lying flat surface off of floor.

1.6 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Building Conditions:
 - a. Conditions inside building shall be brought to levels to be normal at occupancy of building.

- b. Maintain these conditions from material is delivered to site to time Certificate of Substantial Completion is signed.
 - c. Conditions include normal levels of humidity, lighting, heating, and air conditioning.
- 2. Panels:
 - a. Allow panels to acclimate to room temperature 70 deg F for forty eight (48) hours prior to installation.
- 3. Adhesives:
 - a. Application temperature to be between 50 deg F and 90 deg F Provide ventilation to disperse fumes during application of adhesive as recommended by adhesive manufacturer.

1.7 WARRANTY

A. Manufacturer Warranty:

- 1. Provide Manufacturer's warranty against manufacturing defects and workmanship.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:

- 1. Type One Acceptable Manufacturers:

- a. Standard FRP Panels by Marlite, Dover, OH www.marlite.com.
 - b. Equal as approved by Architect before bidding. See Section 01 6200.

B. Materials:

- 1. Panels:

- a. Description:

- 1) Fiberglass reinforced thermosetting polyester resin panel sheets.
 - 2) Resists stains, chemicals, scratches and abrasions and possesses high impact strength.
 - 3) Resistant to moisture. Does not support growth of mold or mildew.

- b. Design Criteria:

- 1) Complying with requirements of ASTM D5319.
 - 2) Meet USDA/FSIS requirements.
 - 3) Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering:
 - a) Flexural Modulus: 3.1×10^5 psi as per ASTM D790. (217.9 kilogram-force/square millimeter).
 - b) Flexural Strength: 1.0×10^4 psi as per ASTM D790. (7.0 kilogram-force/square millimeter).
 - c) Tensile Strength: 7.0×10^3 psi as per ASTM D638. (4.9 kilogram-force/square millimeter).
 - d) Water Absorption: 0.72 percent as per ASTM D570.
 - e) Barcol Hardness (scratch resistance): 35 55 as per ASTM D2583.
 - f) Izod Impact Strength: 70 feet lbs/in as per ASTM D256.

- c. Dimensions:

- 1) Thickness: 0.090 inch nominal.
 - 2) Width: 4 feet nominal.
 - 3) Length: 10 foot or 8 feet as shown on Contract Drawings.

- d. Tolerance:

- 1) Length and Width: +/-1/8 inch.
 - 2) Square: Not to exceed 1/8 inch for 8 feet panels or 5/32 inch for 10 foot panels.

- e. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.

- f. Color And Texture:

- 1) Color and texture as approved by Owner:
 - a) P-199 Bright White, pebbled surface.

- g. Trim Molding:

- 1) PVC Trim Molding with integral color:
 - a) White.

- h. Outside Corner Guard (Include if shown on Contract Drawings):

- 1) Rigid Extruded PVC with integral color.
 - a) White.
 - b) Light Grey.

- i. Base Molding:

- 1) Resilient Base as specified and installed in Section 09 6513: 'Resilient Base And Accessories'.

2.2 ACCESSORIES

- A. Adhesives:
 - 1. Comply with ASTM C557.
 - 2. Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Marlite C 551: Water resistant, non-flammable adhesive.
or
 - b. Marlite C 375: Construction adhesive flexible, water-resistant, solvent based adhesive formulated for fast applications.
- B. Sealants:
 - 1. Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Marlite Brand MS-250 Clear Silicone Sealant.
or
 - b. Marlite Brand MS-251 White Silicone Sealant.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Surface Preparation:
 - 1. Inspect surfaces for conditions not suitable for installation. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.
 - 2. Repair defects prior to installation:
 - a. Level wall surfaces to panel manufacturer's requirements. Remove protrusions and fill indentations.

3.2 INSTALLATION

- A. Comply with manufacturer's recommended procedures and installation sequence.
- B. Allow panels to acclimate to room temperature as specified in Field Conditions in Part 1 of this specification prior to installation.
- C. Apply panels to board substrate vertically oriented with seams plumb and pattern aligned with adjoining panels:
 - 1. Use panels as large as possible to limit amount of joints.
 - 2. Install panels with manufacturer's recommended gap for panel field and corner joints:
 - a. Adhesive trowel and application method to conform to adhesive manufacturer's recommendations.
- D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.
 - 1. All moldings must provide for a minimum 1/8 inch of panel expansion at joints and edges, to insure proper installation.
 - 2. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

3.3 CLEANING

- A. General:
 - 1. Remove excess sealant from panels and moldings.
 - 2. Refer to manufacturer's specific cleaning recommendations:
 - a. Wipe panel down using damp cloth and mild soap solution or cleaner.
 - b. Do not use abrasive cleaners.

END OF SECTION

SECTION 09 9001 COMMON PAINTING AND COATING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Common procedures and requirements for field-applied painting and coating.
- B. Related Requirements:
 - 1. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of shop priming of steel and iron.
 - 2. Section 07 9213: 'Elastomeric Joint Sealants' for quality of Elastomeric Joint Sealants.
 - 3. Sections under 09 9000 heading 'Paints and Coatings'.
 - a. Pre-Installation conferences held jointly with Section 09 9001.
 - 4. Divisions 22 and 23: Painting of plumbing and HVAC identification, refrigerant line insulation, and duct interiors.
 - 5. Section 32 1723: 'Pavement Marking'.

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 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 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.

C. Field Samples:

1. Before application of any paint system, meet on Project site with Architect, Owner's representative, and Manufacturer's representative. Architect may select one (1) surface for application of each paint system specified. This process will include establishing acceptable substrate conditions required for Project before application of paints and coatings.
2. Apply paint systems to surfaces indicated by Architect following procedures outlined in Contract Documents and Product Data submission specified above.
3. After approval of samples, proceed with application of paint system throughout Project. Approved samples will serve as standard of acceptability.

1.6 DELIVERY, STORAGE, AND HANDLING**A. Delivery And Acceptance Requirements:**

1. Deliver specified products in sealed, original containers with Manufacturer's original labels intact on each container.
2. Deliver amount of materials necessary to meet Project requirements in single shipment.
3. Notify Architect two working days before delivery of coatings.

B. Storage And Handling Requirements:

1. Store materials in single place.
2. Keep storage area clean and rectify any damage to area at completion of work of this Section.
3. Maintain storage area at 55 deg F minimum.

1.7 FIELD CONDITIONS**A. Ambient Conditions:**

1. Perform painting operations at temperature and humidity conditions recommended by Manufacturer for each operation and for each product for both interior and exterior work.
2. Apply painting systems at lighting level of 540 Lux (50 foot candles) minimum on surfaces to be painted.
 - a. Inspection of painting work shall take place under same lighting conditions as application.
 - b. If painting and coating work is applied under temporary lighting, deficiencies discovered upon installation of permanent lighting will be considered latent damage as defined in MPI Manual, PDCA P1-92.

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

1. Design Criteria:
 - a. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - b. All materials, preparation and workmanship shall conform to requirements of 'Architectural Painting Specification Manual' by Master Painters Institute (MPI).
 - c. All paint manufacturers and products used shall be as listed under Approved Product List section of MPI Painting Manual.
 - d. Provide Premium Grade systems (2 top coats) as defined in MPI Architectural Painting Specification Manual, except as otherwise indicated.
 - e. Where specified paint system does not have Premium Grade, provide Budget Grade.
 - f. Provide products of same manufacturer for each coat in coating system.
 - g. Where required to meet LEED (Leadership in Energy and Environmental Design) program requirements, use only MPI listed materials having an "L" rating designation.
- h. Color Levels:
 - 1) Color Level II:
 - a) Number and placement of interior and exterior paint colors and gloss levels shall be as defined by Color Level II from MPI Manual, PDCA P3-93 as modified in following paragraph.
 - b) No more than one paint color or gloss level will be selected for same substrate within designated interior rooms or exterior areas.
 - 2) Color Level III:
 - a) Number and placement of interior and exterior paint colors and gloss levels shall be Color Level III from MPI Manual, PDCA P3-93 as modified in following paragraph.
 - b) Several paint colors or gloss levels will be selected for same substrate within designated interior rooms or exterior areas.

B. Materials:

1. Materials used for any painting system shall be from single manufacturer unless approved otherwise in writing by painting system manufacturers and by Architect. Include manufacturer approvals in Product Data submittal.
2. Linseed oil, shellac, turpentine, and other painting materials shall be pure, be compatible with other coating materials, bear identifying labels on containers, and be of highest quality of an approved manufacturer listed in MPI manuals. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on Project.

PART 3 - EXECUTION**3.1 APPLICATORS****A. 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. General:**

1. Do not overspray onto floors or adjacent surfaces.
2. Do not overspray onto gypsum board when finishing hollow metal door frames.
3. Do not overspray onto ceiling or wall when finishing adjacent surfaces.

B. 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.

- C. 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.
 - 2. Paint mechanical, electrical, and audio/visual items that require field painting as indicated in Contract Documents. These include but are not limited to:
 - a. Gas pipe from gas meter into building.
 - b. Mechanical flues and pipes penetrating roof.
 - c. Electrical panel and disconnect enclosures.
 - d. Metal protective structures for refrigerant lines.
 - 3. Metal reveals at ceiling access doors.
 - 4. Paint inside of chases in occupied spaces flat black for 18 inches or beyond sightline, whichever is greater.
- D. Apply sealant in gaps 3/16 inch (and smaller between two substrates that are both to be painted or coated. Sealants in other gaps furnished and installed under Section 07 9213.
- E. 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.
- F. 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.
- G. 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.
- H. Touch up suction spots after application of first finish coat.
- I. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.
- J. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.
- K. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.
- L. Finished work shall be a 'Properly Painted Surface' as defined in this Section.

3.5 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
 - 1. Correct deficiencies in workmanship as required to leave surfaces in conformance with 'Properly Painted Surface,' as defined in this Section.
 - 2. Correction of 'Latent Damage' and 'Damage Caused By Others,' as defined in this Section, is not included in work of this Section.

3.6 CLEANING

- A. General:
 - 1. As work proceeds and upon completion of work of any painting Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition.
- B. Waste Management:
 - 1. Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.
 - 2. Paint, stain and wood preservative finishes and related materials (thinners, solvents, caulking, empty paint cans, cleaning rags, etc.) shall be disposed of subject to regulations of applicable authorities having jurisdiction.
 - 3. Remove debris caused by work of paint Sections from premises and properly dispose.
 - 4. Retain cleaning water and filter out and properly dispose of sediments.

END OF SECTION

ATTACHMENTS**PART 4 - PAINT COLOR SCHEDULE****A. Related Requirements:**

1. Section 09 9112 'Exterior Painted Ferrous Metal'.
2. Section 09 9114 'Exterior Painted CMU'.
3. Section 09 9123 'Interior Painted Gypsum Board-Plaster'.
4. Section 09 9124 'Interior Painted Metal'.
5. Section 09 9125 'Interior Wood Paint'.
6. Section 09 9324 'Interior Clear-Finished Hardwood'.

B. Category Four Colors. See Section 01 6200 for definitions of Categories:**1. Interior:**

- a. Interior Walls: Color '1': SW 7005 Pure White by Sherwin Williams. (See Section 09 9122 for CMU walls and Section 09 9123 for Gypsum Board, Plaster).
- b. Interior Door Frames: SW 7065 Argos by Sherwin Williams. (See Section 09 9124):
- c. Interior Clear Finished Wood (See Section 09 9324):
 - 1) Match other interior clear finished wood building elements.

2. Exterior Color Quality Standards:**a. Exterior CMU (See Section 09 9114):**

- 1) Color 'A': SW 6077, Everyday White by Sherwin Williams.
- 2) Color 'B': SW 6080, Utterly Beige by Sherwin Williams.
- 3) Color 'C':
 - a) Blue.
 - b) Sher-Cryl High Performance Acrylic Semigloss Clear Tint Base - B66T354 by Sherwin Williams.
 - c) Custom Manual Match:

CCE* Colorant	OZ	32	64	128
W1 - White		8	1	
B1 - Black		26		
L1 - Blue	6	20	1	
R3 - Magenta		54		

*Formulas for one gallon of paint

4) Color 'D':

- a) Red.
- b) Sher-Cryl High Performance Acrylic Gloss Safety Red - B66R300 by Sherwin Williams.
- c) Custom Manual Match:

CCE* Colorant	OZ	32	64	128
W1 - White		3		

*Formulas for one gallon of paint

SECTION 09 9112
EXTERIOR PAINTED FERROUS METAL

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Preparing and painting new exterior ungalvanized iron and steel 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 Deseret Industries Projects.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 9001.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved.
- B. Description:
 - 1. New Surfaces: Use MPI(a) EXT 5.1M Waterborne Light Industrial Coating system .
- C. Design Criteria:
 - 1. Systems specified are in addition to prime coats provided under other Sections of Project Manual.
 - 2. Finish Requirements: Use MPI Premium Grade finish requirements for work of this Section.
 - 3. Gloss / Sheen Level Required: Gloss Level 5.
- D. Materials:
 - 1. All paints and coatings.
 - a. Primer Coat: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
 - b. Finish Coats: MPI Product 163, 'Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5).
 - 2. Traffic signage:
 - a. Primer Coat: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
 - b. Finish Coats: MPI Product 163, 'Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5).

PART 3 - EXECUTION**3.1 APPLICATION**

- A. General: See appropriate paragraphs of Section 09 9001.
- B. New Surfaces: Clean metal to be painted of rust, mill scale, grease, oil, and welding spatters, burrs, flux, slag, and fume. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying primer coat.

END OF SECTION

SECTION 09 9113
EXTERIOR PAINTED GALVANIZED METAL

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Preparing and painting new exterior exposed galvanized metal 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'.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 9001.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories.
 - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
 - 1. Handrails And Exposed Miscellaneous Structural Steel:
 - a. New Surfaces: Use MPI(a) EXT 5.3D Pigmented Polyurethane Finish system.
 - 2. All Other:
 - a. New Surfaces: Use MPI(a) EXT 5.3H Latex Finish system.
- C. Performance:
 - 1. Design Criteria:
 - a. New Surfaces: MPI Premium Grade finish requirements.
 - b. Gloss / Sheen Level Required: Gloss Level 5.
- D. Materials:
 - Polyurethane:
 - a. Vinyl Wash Primer Coat: MPI Product 80: 'Primer, Vinyl Wash'.
 - b. Finish Coats:
 - 1) Epoxy MPI Product 101: 'Primer, Epoxy, Anti-Corrosive, for Metal'.
 - 2) Polyurethane MPI Product 72: 'Polyurethane, Two-Component, Pigmented, Gloss (MPI Gloss Level 6-7)'.
 - 2. Latex:
 - a. Waterborne Primer Coat: MPI Product 134: 'Primer, Galvanized, Water Based'.
 - b. Finish Coats: MPI Product 11: 'Latex, Exterior 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. Clean 'passivated' or 'stabilized' galvanized steel as specified in SSPC-SP1.
 - 2. After removal of 'passivated' or 'stabilized' coating or for surfaces without coating, clean surfaces to be painted with mineral spirits or product recommended by Paint Manufacturer. Change to clean rags or wiping cloths regularly to reduce possibility of re-contamination of surface.
 - 3. Apply prime coat.
 - 4. Apply finish coats.

END OF SECTION

SECTION 09 9114
EXTERIOR PAINTED CMU, CONCRETE, STUCCO

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Preparing and painting new exterior masonry, concrete, and stucco 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 Deseret Industries Projects.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 9001.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
 - 1. Concrete:
 - a. New Surfaces: Use MPI(a) EXT 3.1A Latex Finish system.
 - 2. Stucco:
 - a. New Surfaces: Use MPI(a) EXT 3.1A Latex Finish system.
 - 3. CMU:
 - a. New Surfaces: Use MPI(a) EXT 4.2A Latex Finish system.
- C. Performance:
 - 1. Finish Requirements:
 - a. New Surfaces: MPI Premium Grade finish requirements.
 - b. Gloss / Sheen Level Required: Gloss Level 1.
- D. Materials:
 - 1. Block Filler, New CMU Only: MPI Product 4: 'Block Filler, Latex, Interior/Exterior'.
 - 2. Finish Coats: MPI Product 10: 'Latex, Exterior Flat (MPI Gloss Level 1-2)'.
 - 3. Accent Stripe: MPI Product 164: 'Light Industrial Coating, Exterior, Water Based, Gloss (MPI Gloss Level 6)'.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Except for steam cured products, cure cement type surfaces from 60 to 90 days in accordance with Paint Manufacturer's recommendations before painting.

3.2 APPLICATION

- A. General: See appropriate paragraphs of Section 09 9001.
- B. New Surfaces:
 - 1. On highly porous surfaces when weather is exceptionally hot and dry, it may be desirable to dampen surface before applying first coat of an emulsion paint.
 - 2. Completely cover voids in masonry block.
 - 3. Roll after spraying if necessary to eliminate pinholing.

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.
- B. Related Requirements:
 - 1. Section 09 2900: 'Gypsum Board' for:
 - a. Priming new interior gypsum board surfaces to receive sheet wall covering system or texturing.
 - b. Pre-installation conference.
 - 2. Section 09 9001: 'Common Painting And Coating Requirements':
 - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
 - b. 'Attachment: Paint Color Schedule' for Deseret Industries Projects.
 - 3. Section 09 9413: 'Interior Textured Finishing' for textured finishes.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 2900.
 - a. In addition to agenda items specified in Section 01 3100 and Section 09 2900, review following:
 - 1) Review finish level requirements of gypsum wallboard as specified in Section 09 2900.
 - 2. Participate in pre-installation conference as specified in Section 09 9001.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Category Four Approved Manufacturers and Products. See Section 01 6200 for definitions of Categories.
 - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
 - 1. Rest Rooms And Custodial Rooms:
 - a. New Surfaces: Use MPI(a) INT 9.2F Waterborne Epoxy Finish system.
 - 2. All Other:
 - a. New Surfaces: Use MPI(a) INT 9.2B Latex Finish system.
- C. Performance:
 - 1. Design Criteria:
 - a. New Surfaces: MPI Premium Grade finish requirements.
 - b. Gloss / Sheen Required:
 - 1) Rest Rooms And Custodial 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 And Custodial Rooms:
 - 1) Buildings with only Gypsum Board surfaces in rooms:
 - a) MPI Product 115, 'Epoxy-Modified Latex, Interior, Gloss (MPI Gloss Level 6)'.
 - 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.

END OF SECTION

**SECTION 09 9124
INTERIOR PAINTED METAL**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Preparing and painting new interior metal surfaces as described in Contract Documents.
- 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 Deseret Industries Projects.
 - 2. Section 23 0553: 'I. D. For HVAC Piping And Equipment' for field painting requirements of HVAC piping and equipment.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 9001.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories.
 - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
 - 1. Ferrous Metal:
 - a. New Surfaces: Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system.
 - 2. Galvanized Metal:
 - a. New Surfaces: Use MPI(a) INT 5.3J Latex Finish system
 - 3. Aluminum:
 - a. New Surfaces: Use MPI(a) INT 5.4E Waterborne Light Industrial Finish system.
- C. Performance:
 - 1. Design Requirements:
 - a. New Surfaces: MPI Premium Grade finish requirements.
 - b. Gloss / Sheen Level Required: Gloss Level 5.
- D. Materials:
 - 1. Primers:
 - a. Ferrous Metal: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
 - b. Galvanized Metal: MPI Product 134: 'Primer, Galvanized, Water Based'.
 - c. Aluminum: MPI Product 95: 'Primer, Quick Dry, for Aluminum'.
 - 2. Finish Coats: MPI Product 153: 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.

PART 3 - EXECUTION**3.1 APPLICATION**

- A. General:
 - 1. See appropriate paragraphs of Section 09 9001.
 - 2. Systems specified are in addition to prime coats furnished under other Sections.
- B. New Surfaces: Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.

END OF SECTION

**SECTION 09 9125
INTERIOR PAINTED WOOD**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Preparing and painting new woodwork not requiring transparent finish, 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 Deseret Industries Projects.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 9001.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
 - 1. Systems:
 - a. New Surfaces: Use MPI(a) INT 6.3T or U Latex Finish system.
- C. Performance:
 - 1. Design Criteria:
 - a. New Surfaces: MPI Premium Grade finish requirements.
 - b. Gloss / Sheen Level Required: Gloss Level 5.
- D. Materials:
 - 1. Woodwork:
 - a. Primer Coat: MPI Product 39, 'Primer, Latex, for Interior Wood' or MPI Product 45, 'Primer Sealer, Alkyd, Interior'.
 - b. Finish Coats: MPI Product 153, 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.

PART 3 - EXECUTION**3.1 APPLICATION**

- A. General: See appropriate paragraphs of Section 09 9001.
- B. Interface With Other Work:
 - 1. Where back-priming is required, apply one (1) coat of primer.
- C. New Surfaces:
 - 1. Spot prime nail holes, cracks, and blemishes before and after puttying.
 - 2. Apply stain blocker or other product recommended by Paint Manufacturer to knots before applying primer coat.

END OF SECTION

SECTION 09 9324
INTERIOR CLEAR-FINISHED HARDWOOD

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Preparing and finishing of new interior clear finished hardwood as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 06 2210: 'Miscellaneous Wood Trim'.
 - 2. Section 06 4512: 'Architectural Woodwork Wood Trim'.
 - 3. Section 08 1429: 'Interior Flush Wood Doors'.
 - 4. Section 09 9001: 'Common Painting And Coating Requirements':
 - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
 - b. 'Attachment': Paint Color Schedule' for Deseret Industries Projects.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 9001.
 - 2. In addition to agenda items specified in Section 01 3100 and Section 09 9001, review following:
 - a. Review control sample(s).

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Samples:
 - a. Interior Hardwood for Transparent Finish:
 - 1) Requirements for samples are specified in Related Requirement Sections listed above.
 - b. Design Criteria:
 - 1) Sample will be used as performance standard for evaluating finish provided.
- B. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. Before beginning finish work, submit Finish Manufacturer's literature or certification that finish material meets requirements of ANSI / KCMA A161.1.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Materials:
 - 1. Design Criteria:
 - a. See appropriate paragraphs of Section 09 9001.
 - 2. Stain: MPI 90, 'Stain, Semi-Transparent, for Interior Wood'.
 - 3. Clear Finish Coats:
 - a. Field Finished:
 - 1) Chemcraft International Inc:
 - a) First, Second, And Third Coats: 20 Sheen Opticlear Pre-Catalyzed Lacquer.
 - 2) ICI Dulux / Trinity:
 - a) First Coat: ICE Vinyl Sanding Sealer.
 - b) Second And Third Coats: ICI Pre-Catalyzed Lacquer.
 - 3) Lilly / Valspar:
 - a) First, Second, And Third Coats: 20 Sheen Pre-Catalyzed Lacquer 587E208.
 - 4) Sherwin-Williams:
 - a) First Coat: T67F3 Vinyl Sealer.
 - b) Second And Third Coats: T77F38 Sherwood Pre-Catalyzed Lacquer DRE.
 - b. Mill Finished: Architectural Woodwork finished in a mill may use one (1) coat of Vinyl Sealer and two (2) coats of Conversion Varnish or three (3) coats of Conversion Varnish from one (1) of the approved Finish Manufacturers, as recommended by Finish Manufacturer.
 - c. Products meeting testing requirements for finishes of ANSI / KCMA A161.1 may be used upon approval of submission by Architect before use. See Section 01 6200.
 - 4. Color:
 - a. Design Criteria:
 - 1) Finish to match Owner selected sample.
 - b. LDS 110.
 - 1) Performance standard: Owner provided sample.
 - a) Contact Information: Nancy Black (801) 240-2431 BlackNL@ldschurch.org, Meetinghouse Facilities Department.

PART 3 - EXECUTION**3.1 APPLICATION****A. General:**

1. See appropriate paragraphs of Section 09 9001.
2. Sand entire exposed surface of item to be finished lightly with 120 to 150 non-stearated sandpaper and clean before applying dye or stain.
3. Apply stain in accordance with Manufacturer's recommendations and as necessary to attain correct color.
4. Scuff sand with 220 non-stearated sandpaper between application of application stain and first finish coat.
5. If wood is finished before installation, finish cut ends and other unfinished, exposed surfaces same as previously finished surfaces after installation of wood.

B. Where back-priming is required, apply one coat of finish material.**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 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.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Samples:
 - a. Light Orange Peel Texture:
 - 1) Provide minimum of three (3) 24 inch 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 square control samples on primed gypsum wallboard of 'light orange peel' texture to show possible variations.

1.4 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.
 - b. U S Gypsum Co, Chicago, IL 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.
 - 2. Ceilings:
 - a. Light Orange Peel Texture.
- B. Finishing:
 - 1. Light Orange Peel Texture:
 - a. After gypsum board is taped, sanded, and primed, apply texture. Closely match samples accepted by Architect.

END OF SECTION

DIVISION 10: SPECIALTIES

10 1000 INFORMATION SPECIALTIES

- 10 1116 FIXED MARKERBOARDS
- 10 1123 FIXED TACKBOARDS
- 10 1495 MISCELLANEOUS INTERIOR SIGNAGE

10 2000 INTERIOR SPECIALTIES

- 10 2113 METAL TOILET COMPARTMENTS
- 10 2613 CORNER GUARDS
- 10 2813 COMMERCIAL TOILET ACCESSORIES
- 10 2814 BABY-CHANGING STATION

10 4000 SAFETY SPECIALTIES

- 10 4400 FIRE PROTECTION SPECIALTIES

10 5000 STORAGE SPECIALTIES

- 10 5630 INDUSTRIAL-DUTY METAL SHELVING

END OF TABLE OF CONTENTS

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**SECTION 10 1116
FIXED MARKERBOARDS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Provide and install markerboards as indicated in Construction Documents.
- B. Related Requirements:
 - 1. Section 06 1100: 'Wood Framing' for blocking in framed walls for markerboards.
 - 2. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Published installation instructions.
 - b. Printed cleaning instructions.
- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Maintenance instructions.
 - 2) Printed cleaning instructions.
 - b. Warranty Documentation:
 - 1) Manufacturer Warranty.
 - c. Record Documentation:
 - 1) Manufacturer's documentation:
 - a) Manufacturer's product literature.

1.3 WARRANTY

- A. Manufacturer Warranty:
 - 1. Letter from Manufacturer certifying Contract Documents have been complied with and guarantee against faulty workmanship and materials for five (5) years.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Category Two National Contract Manufacturers. See Section 01 6200 for definitions of Categories:
 - 1. ADP Lemco Corporation, Draper, UT www.adplemco.com.
- B. Fixed Markerboard:
 - 1. Coatings shall meet requirements of PEI-1002:
 - a. All Rooms:
 - 1) Coatings shall be for marker use.
 - 2. Color: White.
 - 3. Mounting Hardware: Suitable for wall conditions.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Verify wall blocking is in place for support and attachment of markerboards.
- B. Mount boards square and level.
 - 1. Shim as necessary to provide permanent installation and smooth operation.
 - 2. Anchor boards securely to wall following Manufacturer's printed installation instructions.
 - 3. Anchor concealed hangers with screws at 24 inches on center.
- C. Mounting fasteners shall penetrate framing lumber or blocking 1-1/2 inch minimum. Use toggle bolts or expansion bolts in masonry walls.
- D. After attaching map clips, apply permanently attached end cap or screw to prevent removal of map clips.

END OF SECTION

**SECTION 10 1123
FIXED TACKBOARDS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Provide and install tackboards as indicated in Construction Documents.
- B. Related Requirements:
 - 1. Section 06 1100: 'Wood Framing' for blocking in framed walls for markerboards.
 - 2. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Published installation instructions.
 - b. Printed cleaning instructions.
- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Maintenance instructions.
 - 2) Printed cleaning instructions.
 - b. Warranty Documentation:
 - 1) Manufacturer Warranty.
 - c. Record Documentation:
 - 1) Manufacturer's documentation:
 - a) Manufacturer's product literature.
 - b) Color selection.

1.3 WARRANTY

- A. Manufacturer Warranty:
 - 1. Letter from Manufacturer certifying Contract Documents have been complied with and guarantee against faulty workmanship and materials for five years.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Manufacturer:
 - 1. Category Two National Contract Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. ADP Lemco Corporation, Draper, UT www.adplemco.com.
- B. Fixed Tackboard:
 - 1. Color:
 - a. Sterling or Pelican.
 - b. Mounting Hardware: Suitable for wall conditions.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Mount boards square and level.
 - 1. Shim as necessary to provide permanent installation.
 - 2. Anchor boards securely to wall following Manufacturer's printed installation instructions.
 - 3. Anchor concealed hangers with screws at 24 inches on center.
- B. Mounting fasteners shall penetrate framing lumber or blocking 1-1/2 inch minimum. Use toggle bolts or expansion bolts in masonry walls.
- C. After attaching map clips, apply permanently attached end cap or screw to prevent removal of map clips.

END OF SECTION

**SECTION 10 1495
MISCELLANEOUS INTERIOR SIGNAGE**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install wall sign holder as described in Contract Documents.
 - 2. Furnish and install signs for Rest Rooms doors as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
 - 1. Owner-furnished interior signs.
- C. Related Requirements:
 - 1. Section 01 6400: Owner will furnish designated interior signs. This Section establishes quality of materials and installation for information of Contractor, Architect, and Owner's Representatives.

PART 2 - PRODUCTS**2.1 OWNER FURNISHED PRODUCTS**

- A. Category Four Approved Standard Interior Signs. See Section 01 6200 for definitions of Categories:
 - 1. Visual Identity Office:
 - a. Contact Information:
 - 1) 50 E. North Temple St. Rm. 2350, Salt Lake City, UT 84150-3232.
 - 2) Phone: 1-801-240-1302.
 - 3) Fax: 1-801-240-5997.
 - 4) vidoffice@ldschurch.org.
 - 2. Room Signs: Molded clear acrylic sub-surface graphics sign with set-screw to attach to included mounting bracket.
 - 3. Cabinet Door Signs: Flat clear acrylic sub-surface graphics sign with mounting adhesive in position.
 - 4. Color:
 - a. Background: Welfare Gray.
 - b. Lettering: White.

2.2 MANUFACTURED UNITS

- A. Wall Sign Holder:
 - 1. 8-1/2 inches high by 11 inches wide by 1/4 inch deep of clear plastic.
 - 2. Class Two Quality Standard. See Section 01 6200.
 - a. Item No. 274420 by Corporate Express.
- B. Rest Room Doors Signs:
 - 1. One sign for each designated Rest Room door indicating gender of users.
 - 2. Class Two Quality Standard. See Section 01 6200.
 - a. No. 231595 California Title 24 signs by Best Sign Systems Inc, Montrose, CO www.bestsigns.com.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install interior signs square and plumb:
 - 1. Room Signs:
 - a. Install bracket using two screws. Use proper anchor for substrate.
 - b. Attach sign to bracket using set-screw.
 - c. Mount signs as described in Contract Drawings.

END OF SECTION

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 and door bumper.
 - 2. Section 10 2813: 'Commercial Toilet Accessories'.

1.2 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.

1.3 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.

1.4 WARRANTY

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

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Type One Acceptable Manufacturers:
 - 1. Accurate Partitions Inc, Lyons, IL www.accuratepartitions.com.
 - 2. AMPCO Products Inc, Miami, FL www.ampco.com.
 - 3. Flush-Metal Partition Corp, Maspeth, NY www.flushmetal.com.
 - 4. Hadrian Inc, Mentor, OH www.hadrian-inc.com.
 - 5. Knickerbocker Partitions Corp, Freeport, NY www.knickerbockerpartition.com.
 - 6. Metpar, Westbury, NY www.metpar.com.
 - 7. 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 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 minimum.
 - 2) Panels: 22 ga minimum.
 - 3) Pilasters: 22 ga minimum.
 - 4) Screens: 22 ga minimum.
 - 3. Posts:
 - a. 20 ga minimum of same construction and finish as panels.
 - 4. Headrails:
 - a. Aluminum.
 - b. 20 ga minimum of same construction and finish as panels.
 - c. Anti-grip design.

5. Plinths:
 - a. 20 ga Type 304 stainless steel, Number 4 finish.
 - b. 3 inch 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.
6. Anchorages and fasteners:
 - a. Concealed: Non-corrosive, protective finish.
 - b. Tamper resistant Torx Head with pin screws.
7. Hardware:
 - a. Each door:
 - 1) 4 inch pull each side.
 - 2) Gravity type hinges with double handed, nylon bottom cam, adjustable for partial door closing position, bottom hinge finished flush with door bottom.
 - 3) Sliding or concealed door bolt with emergency access.
 - 4) Door strike and keeper with rubber bumper.
 - 5) Coat hook / door bumper.
 - b. Finish: Chrome plated.
 - c. Meet requirements of ASTM B86, Alloy AG 40A.
- B. Urinal Partition:
 1. Basic construction same as panels above, floor mounted.
 2. Width to be 16 inches minimum.
 - a. Partition maximum width shall not encroach into required accessibility clear floor space.
 3. Height: 18 inches above floor and 66 inches above floor.

2.3 FINISHES

- A. Finish And Color:
 1. Powder-coated paint finish.
 2. Color Quality Standard: See Section 01 6200.
 - a. Hadrian: Light Gray 535

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 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 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 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 two inches from 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 2613
CORNER GUARDS****PART 1 - GENERAL****1.1 SUMMARY**

A. Includes But Not Limited To:

1. Furnish and install corner guards as described in Contract Documents.

1.2 REFERENCES

A. Definitions:

1. Flame Spread: The propagation of flame over a surface.
2. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84.
3. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84.

B. Reference Standards:

1. ASTM International:
 - a. ASTM D256-10(2018), 'Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics'.
 - b. ASTM D543-14, 'Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents'.
 - c. ASTM E84-18b, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
2. Underwriters Laboratories / American National Standards Institute:
 - a. UL/ANSI 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials' 11th Edition).

1.3 SUBMITTALS

A. Action Submittals:

1. Product Data: Color selections.
2. Shop Drawings:
 - a. Show locations, extent and installation details.
 - b. Show method of attachment.
3. Sample:
 - a. Provide 12 inches sample show color, texture, pattern, and guard.

B. Informational Submittals:

1. Test And Evaluation Reports:
 - a. Copies of Quality Assurance requirements for 'Class A' flame spread rating.
2. Qualification Statement:
 - a. Installer:
 - 1) Provide Qualification documentation if requested by Architect or Owner.

C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Maintenance, and cleaning instructions.
 - b. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature.
 - b) Color selection.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. System shall be recognized for intended use by applicable building codes.
2. Fire Test Response Characteristics:
 - a. UL classified conforming to NFPA Class A fire rating with surface burning characteristics as tested materials in accordance with UL 723 (ASTM E84).
 - 1) Flame Spread: 10.
 - 2) Smoke Developed: 350 to 450.
 - b. 20 ft/lbs/ per square inch as tested in accordance with ASTM D256, Notched Izod Test.

B. Qualifications:

1. Installers:
 - a. Installer shall have performed at least three (3) installations of similar size, scope, and complexity in each of the past two (2) years.
 - b. Provide documentation if requested.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Deliver materials in sealed containers with Manufacturer's labels intact.
- B. Storage And Handling Requirements:
 - 1. Store materials in protected area in original, undamaged packaging in a cool, dry place out of direct sunlight and exposure to elements. Minimum room temperature of 40 deg F and a maximum of 100 deg F should be maintained.
 - 2. Material must be stored flat.

1.6 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Material must be acclimated in an environment of 65 deg F to 75 deg F for at least twenty-four (24) hours prior to beginning installation.
 - 2. Installation areas must be enclosed and weatherproofed before installation commences.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Manufacturers:
 - 1. Stainless Steel Corner Guards:
 - a. Type Two Acceptable Manufacturers:
 - 1) Acrovyn, Div Construction Specialties Group, Muncy, PA www.c-sgroup.com.
 - 2) American Floor Products Co, Rockville, MD www.afco-usa.com.
 - 3) IPC Door and Wall Protection Systems, Muskego, WI www.inprocorp.com.
 - 4) Pawling Corp, Pawling, NY www.pawling.com.
 - 5) Equal as approved by Architect before installation. See Section 01 6200.
 - b. Type One Acceptable Manufacturers:
 - 1) Koroseal Wall Protection Systems, Fairlawn, OH www.korogard.com.
 - 2) Equal as approved by Architect before bid. See Section 01 6200.
- B. Materials:
 - 1. Stainless Steel Corner Guards:
 - a. 16-gastainless steel with finish equal to US32D Satin Stainless Steel.
 - b. Size:
 - 1) Wall Corners: 3-1/2 inches by 3-1/2 inches by 48 inches high.
 - 2) Steel Column Corners: 48 inch high, conforming to shape of column without voids and completely enclosing column.
 - 2. Vinyl Corner Guards:
 - a. Design Criteria:
 - 1) Surface mounted and consisting of 1-1/2 inches radius 1/4 inch thick high-impact vinyl / acrylic cover mounted on continuous metal retainer.
 - 2) Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.
 - b. Color and Texture: Grey to closely match color of bumper guards.
 - c. Quality Standard: Koroguard G200 Series.
- C. Fabrication:
 - 1. Fabricate wall protection systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes.

2.2 ACCESSORIES

- A. Adhesive: As supplied or recommended by Corner Guard Manufacturer.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verification Of Conditions:
 - 1. Examine substrate and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.
 - 2. Notify Architect of unsuitable conditions in writing.
 - 3. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation:
 - 1. Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.
- B. Protection:
 - 1. Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

3.3 INSTALLATION

- A. Acceptable Installers:
 - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.
- B. Install the Work of this section in strict accordance with manufacturer's recommendations, using only approved mounting hardware, and locating all components firmly into position, level and plumb.
- C. Maintain ambient conditions for at least forth eight (48) hours.
- D. Install stainless steel guards in retail and processing area and vinyl / PVC guards in office areas.
- E. Apply adhesive carefully to insure continuous contact between wall and guard. Take care to avoid soiling or leaving visible adhesive on wall or base.

3.4 CLEANING

- A. General:
 - 1. Immediately upon completion of installation, clean guards and accessories in accordance with manufacturer's recommended cleaning method.
 - 2. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

3.5 PROTECTION

- A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION

SECTION 10 2813
COMMERCIAL TOILET ACCESSORIES

PART 1 - GENERAL**1.1 SUMMARY**

- A. Included But Is Not Limited To:
 - 1. Selected accessories for Rest Rooms:
 - a. Grab Bars.
 - b. Hand Dryer.
 - c. Mirrors.
 - d. Recessed Waste Receptacle and Cabinet.
 - e. Sanitary Napkin Disposal Container.
 - f. Single Robe Hook.
 - 2. Custodial Room accessories:
 - a. Utility Shelf.
- 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 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. Operations and Maintenance Data:
 - 1) Hand Dryer:
 - a) Manufacturer's service and parts manual.
 - b. Warranty Documentation:
 - 1) Final, executed copy of Warranty for each product.
 - c. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature or cut sheets.

1.3 QUALITY ASSURANCE

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

1.4 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.

C. Hand Dryer:

1. Manufacturer's Warranty to be free from defects for period of five (5) years. Warranty includes labor performed at factory as well as repair or exchange of defective parts, at Manufacturer's option.

PART 2 - PRODUCTS**2.1 OWNER FINISHED PRODUCTS**

A. Furnish and Install 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 wide x 9.75 inches deep x 16.75 inches 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.
 - b. American Specialties Inc (ASI), Yonkers, NY www.americanspecialties.com.
 - c. Bobrick Washroom Equipment Inc, North Hollywood, CA www.bobrick.com or Bobrick Washroom Equipment of Canada Ltd, Scarborough, ON (416) 298-1611.
 - d. Bradley Corp, Menomonee Falls, WI www.bradleycorp.com.
 - e. Excel Dryer Inc., East Longmeadow, MA www.exceldryer.com.
 - f. General Accessory Manufacturing Co (GAMCO), Durant, OK 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 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, type 304 stainless steel tubing.
 - d) 1-1/2 inch 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.
 - 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. Recessed Waste Receptacle and Cabinet:
 - 1) Design Criteria:
 - a) Cabinet: Type 304 stainless steel. Welded construction, exposed surfaces to be satin finish.
 - b) Flange: Type 304 stainless steel 22 gauge with satin finish.
 - c) Waste Receptacle: Type 304 stainless steel 22 gauge with satin finish and 18 gallon capacity.
 - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Bobrick: Model 3947, Semi-Recessed with 18 gallon option (part no. 368-60). Do not include Roll Towel Dispenser Module.
- f. Hand Dryer:
 - 1) Design Criteria:
 - a) Power source: 110/120 volt, 12.5 amp, 60 Hz.
 - b) Semi-recess mounted.
 - c) Sensor activated.
 - d) Provide 'noise reduction nozzle' option.
 - e) Provide 'speed and sound control' option.
 - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Xlerator by Excel Dryer, Model XL-W.
3. Custodial Rooms:
 - a. Utility Shelf:
 - 1) Provide mop / broom hangers, shelf, and rod for hanging rags.
 - 2) Size as shown on Contract Drawings.

- 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) AJW Architectural Products: Model UJ41.
 - b) American Specialties (ASI): Model 1300 Series.
 - c) Bobrick: Model B-224 Series.
 - d) Bradley: Model 9933 Series.
 - e) General Accessory (GAMCO): Model US Series.

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 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. Provide and install baby-changing stations as described in Contract Documents.
- B. Related Sections:
 - 1. 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 G21-15, 'Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi'.
 - b. ASTM F2285-04(2016), '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.
 - 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 MANUFACTURED UNITS**

- A. Category Two Approved Manufacturer. See Section 01 6200 for definition of Categories:
 - 1. Koala, Denver, CO 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. Antimicrobial bed surface
 - c. Support 200 lbs with minimal deflection.
 - d. Meet ADA regulations of ICC/ANSI A117.1 when properly installed.

- e. 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. Install using mounting devices proper for base structure.

END OF SECTION

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Wall hung extinguishers and brackets.
 - 2. Extinguishers with cabinets.
- B. Related Requirements:
 - 1. Section 06 1100: 'Wood Framing' for blocking in framed walls for markerboards.
 - 2. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature or cut sheets for cabinets and extinguishers.
- B. 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.
 - b. Record Documentation:
 - 1) Testing and Inspection Reports:
 - a) Testing Agency Inspecting Reports of Drilled-In Mechanical Anchors / Adhesive Anchors / Screw Anchors.

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Fire extinguishers shall be inspected and have annual inspection tag attached before Substantial Completion.

1.4 WARRANTY

- A. Manufacturer Warranty:
 - 1. Manufacturer's standard, written warranty on fire extinguisher.

PART 2 - PRODUCTS**2.1 EQUIPMENT**

- A. Manufacturers:
 - 1. Fire Extinguishers:
 - a. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.
 - 1) Amerex Corp, Trussville, AL www.amerex-fire.com.
 - 2) Ansul Incorporated, Marinette, WI www.ansul.com.
 - 3) Buckeye Fire Equipment, Kings Mountain, NC www.buckeyef.com.
 - 4) Extinguishers private-labeled by manufacturers approved above are approved, with appropriate documentation.
 - 2. Cabinets And Brackets:
 - a. Type One Acceptable Manufacturers:
 - 1) J L Industries, Bloomington, MN www.jlindustries.com.
 - 2) Larsen's Manufacturing Co, Minneapolis, MN www.larsensmfg.com.
 - 3) Modern Metal Products / Technico, Owatonna, MN www.modern-metal.com.
 - 4) National Fire Equipment Ltd, Scarborough, ON www.nationalfire.com.
 - 5) Potter-Roemer, Cerritos, CA www.potterroemer.com.
 - 6) Samson Products Inc, City of Commerce, CA www.samsonproducts.com.
 - 7) Seton Inc, Richmond Hill, ON (905) 764-1122.
 - 8) Equal as approved by Architect before bidding. See Section 01 6200.
- B. Type One Acceptable Distributors:
 - 1. W.W. Grainger, Inc., Lake Forest, IL www.grainger.com.
 - 2. Equal as approved by Architect before bidding. See Section 01 6200.
- C. Fire Extinguishers:
 - 1. Design Criteria:
 - a. Ten pound dry chemical ABC stored pressurized type equipped with pressure gauge and which does not need recharging except after use.
 - b. Instructions for repairs, maintenance, and recharging shall be attached.
 - c. Unit shall be tested and approved by UL and have minimum 4A:60-B:C UL rating. UL rating shall appear on extinguisher labels and be attached to and a part of fire extinguisher units.

- D. Fire Extinguisher Cabinets:
 - 1. Design Criteria:
 - a. Two-piece, semi-recessed or flush type depending on wall thickness, and have white baked enameled steel tubs with white baked enamel return trim and doors, clear acrylic glazing, 'Safe-T-Lock,' and cylinder locks.
 - b. Supply each cabinet with one specified fire extinguisher.
 - 2. Type One Acceptable Manufacturers:
 - a. Basis of Design Product: Ambassador 1017 G10 by J L Industries.
 - b. Equal as approved by Architect before bidding from Acceptable Manufacturer's equivalent product. See Section 01 6200.
- E. Wall-Mounted Brackets:
 - 1. Design Criteria:
 - a. Heavy duty with minimum of double strap/bracket.
 - 2. Category Four Approved Bracket. See Section 01 6200 for definitions of Categories:
 - a. Basis of Design Product: No. 846 by Larsen's.
 - b. Equal as approved by Architect before bidding from Approved Manufacturer's equivalent product.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Special Techniques:
 - 1. Securely mount cabinets and hangers plumb with wall surfaces.
 - 2. Trim for cabinets shall be neat in appearance.

END OF SECTION

SECTION 10 5630
INDUSTRIAL-DUTY METAL SHELVING

PART 1 - GENERAL**1.1 SUMMARY**

A. Includes But Not Limited To:

1. Furnish and install Boltless Metal Shelving as described in Contract Documents.

1.2 REFERENCES

A. Reference Standards:

1. American National Standards Institute:
 - a. ANSI MH16.1-2012, 'Specification for the Design, Testing and Utilization of Industrial Steel Storage Racks'.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

A. Suppliers:

1. Category Four Approved Suppliers. See Section 01 6200 for definitions of Categories:
 - a. W. W. Grainger, Inc, Lake Forest, IL www.grainger.com.

B. Design Criteria:

1. Industrial-duty free-standing open metal shelving.
2. Capacity: 650 pounds, minimum.
3. Size: 48 inches wide, 18 inches deep, 85 inches tall.
4. Construction:
 - a. Boltless design.
 - b. 5 adjustable shelves.

C. Finishes:

1. Manufacturer's standard finish.

PART 3 - EXECUTION**3.1 INSTALLATION**

A. Unpackage components and assemble units in accordance with manufacturer's instructions.

END OF SECTION

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DIVISION 11: EQUIPMENT

11 3000 RESIDENTIAL EQUIPMENT

11 3113 RESIDENTIAL KITCHEN APPLIANCES

11 5000 EDUCATIONAL AND SCIENTIFIC EQUIPMENT

11 5213 PROJECTION SCREENS

END OF TABLE OF CONTENTS

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**SECTION 11 3113
RESIDENTIAL KITCHEN APPLIANCES**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Installed But Not Furnished Under This Section:
 - 1. Refrigerator and microwave oven.
- B. Related Requirements:
 - 1. Section 01 6400: Owner will furnish Appliances. This Section establishes quality of materials for information of Contractor, Architect, and Owner's Representatives.
 - 2. Division 26: 'Electrical' for outlets and electrical service.

1.2 SUBMITTALS

- A. 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 packaged for each appliance.

PART 2 - PRODUCTS**2.1 OWNER-FURNISHED PRODUCTS**

- A. Category Two National Contract Manufacturers. See Section 01 6200 for definitions of Categories:
 - 1. Refrigerator / Freezer:
 - a. Approved Manufacturer:
 - 1) General Electric.
 - 2. Microwave Oven:
 - a. Approved Manufacturers:
 - 1) General Electric.
 - 2) Panasonic.
 - 3) Samsung.
 - 4) Amana.
- B. Manufactured Units:
 - 1. Refrigerator / Freezer:
 - a. 16 cu ft frost-free model with top freezer compartment and reversible doors.
 - b. Color: White.
 - 2. Microwave Oven:
 - a. 800 watts.
 - b. Dimensions: 12 inches high by 24 inches wide by 13 inches deep.
 - c. Color: White.

PART 3 - EXECUTION: Not Used

END OF SECTION

**SECTION 11 5213
PROJECTION SCREENS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Installed But Not Furnished Under This Section:
 - 1. Coordination, sequencing, and adjusting of Owner-Furnished projection screens and brackets as described in the Contract Documents.
- B. Related Requirements:
 - 1. Section 01 6400: 'Owner-Furnished Products', Owner will furnish projection screens and brackets. 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 framed walls for markerboards.
 - 3. Section 06 2001: 'Common Finish Carpentry Requirements' for installation of Owner-Furnished projection screens and brackets.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the efforts of the various trades affected by the Work of this Section.
 - 2. Coordinate completions of solid blocking in framed walls.
- B. Sequencing:
 - 1. Install projections screens after following has been completed:
 - a. Solid blocking installed in framed walls for projection screen brackets.
 - b. Adjacent walls and ceilings are finished and painted.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature or cut sheet.
- B. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Written installation instructions.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Manufacturer's operating instructions.
 - b. Record Documentation:
 - 1) Manufacturers Documentation:
 - a) Manufacturer's literature or cut-sheet.

1.4 WARRANTY

- A. Manufacturer's standard warranty against defects in material and workmanship.

PART 2 - PRODUCTS**2.1 OWNER-FURNISHED PRODUCTS**

- A. Manufacturer:
 - 1. Category Two National Contract Manufacturers. See Section 01 6200:
 - a. Draper Inc, Spiceland, IN www.draperinc.com.
- B. Materials:
 - 1. Wall-Mounted Manual Projection Screen:
 - a. Manually operated roll up screen unit.
 - b. One-piece steel roller.
 - c. 22 ga steel case finished in manufacturer's standard grey color.
 - d. 16 ga steel end caps finished to match case.
 - e. Flame retardant screen.
 - f. Matte white.
 - g. Manufacturer's wall mounting brackets:
 - 1) Non-adjustable brackets.
 - 2) Screen can be extended 6 inch from wall to clear chalkboards and other obstacles.
 - 3) Color: white.
 - h. Tubular steel slat bottom with ends protected by vinyl caps.
 - i. Category Two Approved Products. See Section 01 6200 for definition of Categories:
 - 1) Screen: 96 inch square:
 - a) Spring-Roller operated.
 - b) Model: Luma Manual Projection Screen by Draper.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verification Of Conditions:
 - 1. Verify solid blocking has been installed in framed walls for projection screen brackets.
 - 2. Verify adjacent walls and ceilings are finished and painted.
 - 3. Notify Architect in writing of inadequate conditions.

3.2 INSTALLATION

- A. Interface With Other Work:
 - 1. Coordinate with Section 06 1100: 'Wood Framing' for blocking location in wood stud framed walls for projection screen brackets.
 - 2. Coordinate with Section 09 2216: 'Non-Structural Metal Framing' for blocking location in metal framed walls for projection screen brackets.
- B. Follow Manufacturer's written installation instructions at locations as indicated on Contract Documents.

END OF SECTION

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DIVISION 12: FURNISHINGS

12 2000 WINDOW TREATMENTS

12 2113 HORIZONTAL LOUVER BLINDS

12 2116 VERTICAL LOUVER BLINDS

12 4000 FURNISHINGS AND ACCESSORIES

12 4619 CLOCKS

12 9000 OTHER FURNISHINGS

12 9324 WASTE RECEPTACLES

END OF TABLE OF CONTENTS

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**SECTION 12 2113
HORIZONTAL LOUVER BLINDS**

PART 1 - GENERAL**1.1 SUMMARY**

A. Includes But Not Limited To:

1. Furnish and install horizontal louver blinds as described in Contract Documents.

1.2 SUBMITTALS

A. Action Submittals:

1. Samples:

- a. 12 inch square sample including specified elements of finished blind. Do not fabricate blinds until sample has been reviewed and approved by Architect.
- b. Provide sample of specified approved color.

B. Informational Submittals:

1. Manufacturer Instructions:
 - a. Illustrated step-by-step installation instructions.
2. Qualification Statement:
 - a. Installers:
 - 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) Manufacturer's operating and maintenance instructions.
 - b. Warranty Documentation:
 - 1) Copy of Warranty.
 - c. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature.
 - b) Color selection.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installers: Requirements of Section 01 4301 applies, but not limited to following:
 - a. Minimum three (3) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.
 - b. Upon request, submit documentation.

1.4 WARRANTY

A. Manufacturer Warranty:

1. Provide warranty against manufacturing defects.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

A. Manufacturers:

1. Manufacturer Contact List:

- a. Blynco Manufacturing and Distributing, Inc., Las Vegas, NV. Contact (800) 777-7606 or e-mail bwfquotes@blynco.com.
- b. Graber, Montgomery, PA www.graberblinds.com or Graber / AbbeyBlinds, Inc, Richmond, BC (800) 663-1606 or (604) 279-0021.
- c. Hunter Douglas Commercial Window Treatments, Poway, CA www.hunterdouglas.com.
- d. Levelor Corporation, High Point, NC www.levelorcontract.com or Levelor Corporation / Canadian Window Covering Corp, Toronto, ON (416) 252-3751.

B. Performance:

1. Design Criteria:

- a. Horizontal blinds including following design requirements:
 - 1) Aluminum slats: One inch.
 - 2) Brackets: Installation brackets including intermediate brackets where required by width of space being covered.
 - 3) Braided ladder.
 - 4) Bottom rail and lift cord.
 - 5) Cord lock.
 - 6) Drum and cradles.
 - 7) End brace.
 - 8) Head Channel.

- 9) Manual operators and controls.
- 10) Tilter.
- 11) Tilt rod.

C. Materials:

- 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Blynco: Advantage Alabaster.
 - b. Graber: 'Classic' #112 Alabaster.
 - c. Hunter Douglas: CD Series' CD80 #002 Alabaster.
 - d. Levelor: 'Riviera' #112 Alabaster or Golden Touch 'Premier' #213 Alabaster.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

- 1. Inspect existing conditions and approve mounting surfaces and installation conditions before proceeding with work of this section.
- 2. Field verify dimensions of openings to be covered before ordering materials specified in this section.

3.2 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions including recommended support brackets and fasteners.
- B. Install blinds with adequate clearance to permit smooth operation of blinds. Demonstrate blinds to be in smooth, uniform working order.

END OF SECTION

**SECTION 12 2116
VERTICAL LOUVER BLINDS**

PART 1 - GENERAL**1.1 SUMMARY**

A. Includes But Not Limited To:

1. Furnish and install vertical louver blinds as described in Contract Documents.

1.2 SUBMITTALS

A. Action Submittals:

1. Samples

- a. 24 inch wide by 24 inch high sample including specified elements of finished blind. Do not fabricate blinds until sample has been reviewed and approved by Architect.
- b. Full selection of Manufacturer's standard colors.

B. Informational Submittals:

1. Manufacturer Instructions:
 - a. Illustrated step-by-step installation, operation, and maintenance instructions.
2. Qualification Statement:
 - a. Installers:
 - 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) Manufacturer's operating instructions.
 - b. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature.
 - b) Color selection.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installers: Requirements of Section 01 4301 applies, but not limited to following:
 - a. Minimum three (3) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.
 - b. Upon request, submit documentation.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

A. Manufacturers:

1. Manufacturer Contact List:
 - a. Colton Inc, Salt Lake City, UT www.coltoninc.com.
 - b. Graber, Montgomery, PA www.graberblinds.com or Graber / AbbeyBlinds, Inc, Richmond, BC (800) 663-1606 or 604) 279-0021.
 - c. Hunter Douglas Commercial Window Treatments, Poway, CA www.hunterdouglas.com.
 - d. Levelor Corporation, High Point, NC www.levelorcontract.com or Levelor Corporation / Canadian Window Covering Corp, Toronto, ON (416) 252-3751.

2. Product:

- a. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
 - 1) Vertical Blinds by Colton.
 - 2) G-98 Perfect-Vue by Graber.
 - 3) Vertical PVC Blinds by Hunter Douglas.
 - 4) MR-CS II Vertical Blind by Levolor.

B. Materials:

1. 3-1/2 inch wide PVC vane vertical blinds including following requirements:
 - a. One-way stack at end designated by Owner.
 - b. Wall-mounted cord tensioner.
 - c. One vane insert valence.
 - d. Connecting / spacer chain at bottom of vanes.
 - e. Installation brackets including intermediate brackets where required by width of space being covered.
 - f. Manual nickel-plated bead chain operators and controls.
2. Color Performance Standard: No. 228, Light Grey by Colton.

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

1. Inspect existing conditions and approve mounting surfaces and installation conditions before proceeding with work of this section.
2. Field verify dimensions of openings to be covered before ordering materials specified in this section.

3.2 ADJUSTING

- A.** Adjust installed blinds to operate smoothly, easily, and free from binding or malfunction throughout operational range.

END OF SECTION

**SECTION 12 4619
CLOCKS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Installed But Not Furnished Under This Section:
 - 1. Wall Clocks.
- B. Related Requirements:
 - 1. Section 01 6400: Owner will furnish Wall Clocks. PART 2 of this Section establishes quality of materials for information of Contractor, Architect, and Owner's Representatives.

PART 2 - PRODUCTS**2.1 OWNER-FURNISHED PRODUCTS**

- A. Wall Clocks:
 - 1. Category Four Approved Suppliers. See Section 01 6200 for definitions of Categories:
 - a. Staples Advantage, PO Box 95708, Chicago, IL, phone (877) 295-0003, fax (800) 270-7611.
 - 1) Howard Miller model HOW625323.
- B. Manufactured Units:
 - 1. Wall Clocks:
 - a. Description:
 - 1) Non-chiming.
 - 2) Matte black case with shatter-resistant crystal.
 - 3) White dial and large, easy-to-read black Arabic numerals.
 - 4) Quartz, battery-operated movement, Auto Daylight Savings movement automatically adjusts for Daylight Saving Time, and requires one AA sized battery (not included).
 - b. Size:
 - 1) Depth: 2-1/2 inch.
 - 2) Diameter: 14 inches.
 - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Model 625-323 Alton by Howard Miller, Zeeland, MI, www.howardmiller.com.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Wall Clocks:
 - 1. Mount at height as shown and in locations as shown on Contract Drawings.

END OF SECTION

**SECTION 12 9324
WASTE RECEPTACLES**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Products Installed But Not Furnished Under This Section:
 - 1. Exterior Waste Receptacle.
 - 2. Smoking Waste Receptacle.
- B. Related Requirements:
 - 1. Section 01 6400: Owner will furnish Exterior Waste Receptacle and Smoking Waste Receptacle. PART 2 of this Section establishes quality of materials for information of Contractor, Architect, and Owner's Representatives.
 - 2. Section 06 2001: 'Common Finish Carpentry Requirements' for installation.

1.2 REFERENCES

- A. Association Publications:
 - 1. United States Department of Justice Civil Rights Division (www.ADA.gov).
 - a. The Americans with Disabilities Act of 1990:
 - 1) Guidance on the 2010 ADA Standards for Accessible Design.

PART 2 - PRODUCTS**2.1 OWNER-FURNISHED PRODUCTS**

- A. Exterior Waste Receptacle and Smoking Waste Receptacle:
 - 1. Category Two Approved Suppliers. See Section 01 6200 for definitions of Categories:
 - a. Hy-Ko Supply, Salt Lake City, UT:
 - 1) Contact Information: phone (801) 973-6099, email hykorgs@hyko.com.
- B. Manufactured Units:
 - 1. Exterior Waste Receptacle:
 - a. Waste Receptacle:
 - 1) 9W03 Landmark Series Dome Top with Panel Frame and 3958 Rigid Liner.
 - 2) Description:
 - a) Dome Top with Panel Frame.
 - b) Standard bolt-down base for stability.
 - c) Waste receptacles include rigid liner (ordered separately).
 - 3) Design Criteria:
 - a) Volume Capacity: 35 gallon
 - b) Meet Americans with Disabilities Act requirements.
 - 4) Size:
 - a) Length: 24 inches.
 - b) Width: 24 inches.
 - c) Height: 43 inches.
 - d) Square: 24 inches.
 - 5) Color: Black.
 - 6) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) 9W03 Landmark Series Model FG9W0300 BLA by Newell Rubbermaid, Atlanta, GA www.rubbermaidcommercial.com.
 - b. Decorative Panels:
 - 1) 9W05 Decorative Panels for 9W03 Container (sold separately).
 - 2) Set of 4 slide-in decorative panels.
 - 3) Size:
 - a) Height: 0.1 inch.
 - b) Length: 20 inches.
 - c) Width: 12 inches
 - 4) Color: Sterling Gray.
 - 5) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Landmark Series Decorative Panels for 9W03 Containers. Model FG9W0500SGRAY by Newell Rubbermaid, Atlanta, GA www.rubbermaidcommercial.com.
 - 2. Smoking Waste Receptacle:
 - a. Description:
 - 1) Ash Tray and Cigarette Receptacle:

- a) Tuscan style.
- b) Installation style: freestanding.
- c) Inner galvanized steel canister securely holds large quantities of cigarette waste.
- d) Restricted opening shields cigarette butts from view, weather and flow of oxygen.
- e) Two-piece design makes cleaning quick and easy.
- f) Steel base plate adds weight for stability and discourages theft.
- g) Constructed of smooth injection molded plastic, rust resistant and easy to clean.
- h) Anchor holes.
- b. Design Criteria:
 - 1) Meet Americans with Disabilities Act requirements.
 - 2) Meet Factory Mutual (FM) approval for fire safety.
 - 3) UL Listed fire-safe/self-extinguishing.
- c. Size:
 - 1) Length: 13 inches.
 - 2) Width: 13 inches.
 - 3) Height: 38.4 inch 37 inches.
 - 4) Square: 13 inches.
- d. Color: Black.
- e. Anchor:
 - 1) 3/8 inch 2-1/2 inch bolt.
 - 2) 5/8 inch O.D. x 1-1/2 inches concrete sleeve.
- f. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Ash Receptacles GroundsKeeper Tuscan, Model FG9W3000 BLA by Newell Rubbermaid, Atlanta, GA www.rubbermaidcommercial.com.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Exterior Waste Receptacle:
 - 1. Anchor to concrete slab.
- B. Smoking Waste Receptacle:
 - 1. Anchor to concrete slab.

END OF SECTION

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DIVISION 22: PLUMBING

22 0500 COMMON WORK RESULTS FOR PLUMBING

- 22 0501 COMMON PLUMBING REQUIREMENTS
- 22 0529 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
- 22 0548 VIBRATION AND SEISMIC CONTROLS 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 1119 DOMESTIC WATER PIPING SPECIALTIES
- 22 1313 FACILITY SEWERS
- 22 1319 FACILITY SANITARY SEWER SPECIALTIES

22 3000 PLUMBING EQUIPMENT

- 22 3305 ELECTRIC DOMESTIC WATER HEATERS

22 4000 PLUMBING FIXTURES

- 22 4213 COMMERCIAL WATER CLOSETS AND URINALS
- 22 4216 COMMERCIAL LAVATORIES AND SINKS
- 22 4700 DRINKING FOUNTAINS AND WATER COOLERS

END OF TABLE OF CONTENTS

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**SECTION 22 0501
COMMON PLUMBING REQUIREMENTS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Common requirements and procedures for plumbing systems.
 - 2. Responsibility for proper operation of electric powered equipment furnished under this Division.
 - 3. Furnish and install sealants relating to installation of systems installed under this Division.
 - 4. Furnish and install Firestop Penetration Systems for plumbing systems penetrations as described in Contract Documents.
- B. Products Furnished But Not Installed Under This Section:
 - 1. Sleeves, inserts, supports, and equipment for plumbing systems installed under other Sections.
- C. Related Requirements:
 - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for exterior concrete pads and bases for mechanical equipment.
 - 2. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
 - 3. Section 07 8400: 'Firestopping' for quality of penetration firestop systems to be used on Project and submittal requirements.
 - 4. Section 07 9213: 'Elastomeric Joint Sealant' for quality at building exterior.
 - 5. Sections Under 09 9000 Heading: 'Paints And Coatings' for painting of plumbing items requiring field painting.
 - 6. Section 22 0548: 'Vibration And Seismic Control for Plumbing Piping and Equipment'.
 - 7. Division 26: 'Electrical' for raceway and conduit, unless specified otherwise, and line voltage wiring.
 - 8. Division 33: 'Utilities' for piped utilities.
 - 9. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's catalog data for each manufactured item.
 - 1) Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
 - 2) Include name, address, and phone number of each supplier.
- B. Informational Submittals:
 - 1. Qualification Statement:
 - a. Plumbing Subcontractor:
 - 1) Provide Qualification documentation if requested by Architect or Owner.
 - b. Installer:
 - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data (Modify and add to requirements of Section 01 7800):
 - 1) At beginning of PLUMBING section of Operations And Maintenance Manual, provide master index showing items included:
 - a) Provide name, address, and phone number of Architect, Architect's Mechanical Engineer, General Contractor, and Plumbing subcontractor.
 - b) Identify maintenance instructions by using same equipment identification used in Contract Drawings. Maintenance instructions shall include:
 - (1) List of plumbing equipment used indicating name, model, serial number, and nameplate data of each item together with number and name associated with each system item.
 - (2) Manufacturer's maintenance instructions for each piece of plumbing equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance instructions.

- c) Provide operating instructions to include:
 - (1) General description of fire protection system.
 - (2) Step by step procedure to follow for shutting down system or putting system into operation.
- b. Warranty Documentation:
 - 1) Include copies of warranties required in individual Sections of Division 22.

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Perform work in accordance with applicable provisions of Plumbing Codes applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
 - 2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.
 - 3. Identification:
 - a. Motor and equipment name plates as well as applicable UL / ULC and AGA / CGA labels shall be in place when Project is turned over to Owner.
- B. Qualifications. Requirements of Section 01 4301 applies, but not limited to following:
 - 1. Plumbing Subcontractor:
 - a. Company specializing in performing work of this section.
 - 1) Minimum five (5) years experience in plumbing installations.
 - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
 - b. Upon request, submit documentation.
 - 2. Installer:
 - a. Licensed for area of Project.
 - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
 - c. Upon request, submit documentation.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Accept valves on site in shipping containers with labeling in place.
 - 2. Provide temporary protective coating on cast iron and steel valves.
 - 3. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. Storage And Handling Requirements:
 - 1. In addition to requirements specified in Division 01, stored material shall be readily accessible for inspection by Architect until installed.
 - 2. Store items subject to moisture damage in dry, heated spaces.

1.5 WARRANTY

- A. Manufacturer Warranty:
 - 1. Provide certificates of warranty for each piece of equipment made out in favor of Owner.
- B. Special Warranty:
 - 1. Guarantee plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
 - 2. If plumbing sub-contractor with offices located more than 150 miles from Project site is used, provide service / warranty work agreement for warranty period with local plumbing sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.
- B. Pipe And Pipe Fittings:
 - 1. Weld-O-Let and Screw-O-Let fittings are acceptable.
- C. Sleeves:
 - 1. General:
 - a. Two sizes larger than bare pipe or insulation on insulated pipe.

2. In Concrete And Masonry:
 - a. Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.
3. In Framing And Suspended Floor Slabs:
 - a. Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 ga galvanized sheet metal.
- D. Valves:
 1. Valves of same type shall be of same manufacturer.

PART 3 - EXECUTION

3.1 INSTALLERS

- A. Acceptable Installers. See Section 01 4301:
 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.

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 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 of straight run.
 - b. Provide 12 inch 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 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 Facility Manager 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.

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 05 0523: 'Metal Fastening' for quality and requirements for welding.
 - 2. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
 - 3. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.
 - 4. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.
 - 5. Section 23 0529: 'Hangers And Supports For HVAC Piping And Equipment' for gas piping used with HVAC equipment.
 - 6. Section 23 0553: 'Identification For HVAC Piping And Equipment' for paint identification of gas piping used with HVAC equipment.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's catalog data for each manufactured item.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Anvil International, Portsmouth, NH www.anvilintl.com.
 - b. Cooper B-Line, Highland, IL www.b-line.com.
 - c. Unistrut, Wayne, MI 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 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 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 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 in diameter and larger from clevis hanger, copper plated hangers and otherwise fully suitable for use with copper tubing. Support non-copper uninsulated pipes from clevis hanger.

a) Type Two Acceptable Products:

- (1) Clevis Hanger For Copper Pipe: Anvil Fig. CT-65.
- (2) Clevis Hanger For Other Pipe: Anvil Fig. 260.
- (3) Equals by Cooper B-Line.

- c. Support rods for single pipe shall be in accordance with following table:

Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller
1/2 inch	2-1/2 to 3-1/2 inches
5/8 inch	4 to 5 inches
3/4 inch	6 inches
7/8 inch	8 to 12 inches

- d. Support rods for multiple pipe supported on steel angle trapeze hangers shall be in accordance with following table:

Rods		Number of Pipes per Hanger for Each Pipe Size						
Number	Diameter	2 Inch	2.5 Inch	3 Inch	4 Inch	5 Inch	6 Inch	8 Inch
2	3/8 Inch	Two	0	0	0	0	0	0
2	1/2 Inch	Three	Three	Two	0	0	0	0
2	5/8 Inch	Six	Four	Three	Two	0	0	0
2	5/8 Inch	Nine	Seven	Five	Three	Two	Two	0
2	5/8 Inch	Twelve	Nine	Seven	Five	Three	Two	Two

- 1) Size trapeze angles so bending stress is less than 10,000 psi.

- e. Riser Clamps For Vertical Piping:

1) Type Two Acceptable Products:

- a) Anvil Fig. 261.
- b) Equals by Cooper B-Line.

- f. Concrete Inserts:

1) Individual Inserts:

- a) Suitable for special nuts size 3/8 inch through 7/8 inch with yoke to receive concrete reinforcing rods, and with malleable iron lugs for attaching to forms.
- b) Type Two Acceptable Products:
 - (1) Anvil Fig. 282.
 - (2) Equals by Cooper B-Line.

2) Continuous Inserts:

- a) Class Two Quality Standard: Equal to Unistrut P-3200 series.

- g. Steel Deck Bracket:

- 1) Class Two Quality Std: Equal to Unistrut P1000 with clamp nut, minimum 6 inch length.

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 on center maximum for pipe 1-1/4 inches or larger and 72 inches on center maximum for pipe 1-1/8 inch or less.
 - 2) Support thermoplastic pipe at 48 inches on center maximum.
 - 3) Support PEX pipe at 32 inches 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.

- d. Attach Unistrut to structural steel roof supporting structure. Spacing and support as described above.
- e. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.

END OF SECTION

SECTION 22 0548**VIBRATION AND SEISMIC CONTROL FOR PLUMBING PIPING AND EQUIPMENT****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Quality of and requirements for anchorage and seismic restraint systems and vibration isolation systems for plumbing piping and equipment.
- B. Related Requirements:
 - 1. Section 03 3053: 'Miscellaneous Exterior Cast-In-Place Concrete'.
 - 2. Section 22 3423: 'Gas Domestic Water Heaters'.
 - 3. Furnishing and installing of seismic restraint and vibration isolation systems is by installer of equipment requiring such systems.
 - a. Manufacturers of equipment specified to receive seismic restraint shall provide product data needed for calculation of seismic restraint needs. This information shall include, but not be limited to, equipment dimensions, dimensioned anchor points, operating weight, and center of gravity dimension.

1.2 REFERENCES

- A. Association Publications:
 - 1. Federal Emergency Management Agency (FEMA) / Vibration Isolation and Seismic Control Manufacturers Association (VISCMA) / American Society of Civil Engineers (ASCE):
 - a. FEMA 412, 'Installing Seismic Restraints For Mechanical Equipment' (December 2002).
 - 2. Vibration Isolation and Seismic Control Manufacturers Association (VISCMA):
 - a. VISCMA 101-12, 'Seismic Restraint Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.
 - b. VISCMA 102-12, 'Vibration Isolation Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.
- B. Definitions:
 - 1. Vibration Isolation: Vibration reduction in which an isolation system is placed between the source of unwanted vibration and an item which needs to be shielded from the vibration.
- C. Reference Standards:
 - 1. American National Standards Institute / Sheet Metal And Air Conditioning Contractors' National Association:
 - a. ANSI/SMACNA 001-2008, 'Seismic Restraint Manual: Guidelines For Mechanical Systems' (3rd Edition).
 - 2. American Society of Civil Engineers / Structural Engineering Institute:
 - a. ASCE/SEI 7-10, 'Minimum Design Loads for Buildings and Other Structures'.
 - 1) Chapter 13, 'Seismic Design Requirements For Nonstructural Components'.
 - 3. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
 - a. 2011 ASHRAE Handbook - HVAC Applications.
 - 1) Chapter 48, 'Noise and Vibration Control'.
 - 2) Chapter 55, 'Seismic- and Wind-Resistant Design'.
 - 4. ASTM International:
 - a. ASTM A615/A615M-12, 'Standard Specification for Deformed & Plain Billet-Steel Bars for Concrete Reinforcement'.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Restraint system and anchorage method to be used for each piece of equipment.
 - b. Seismic restraints and calculations for all flexible mounted equipment.
 - c. Vibration isolators and flexible couplings.
 - d. Clearly outlined procedures for installing and adjusting isolators, seismic bracing anchors, and snubbers.
 - 2. Shop Drawings:
 - a. Show size, hanger length, and location of seismic restraints for piping and ductwork.
 - b. Show details for each isolator and seismic brace with snubbers proposed for specified equipment.
 - c. Show details for proposed structural steel frames and rails and for anchors to be used in conjunction with isolation of equipment.
 - d. Show locations of piping and ductwork restraints on installation and fabrication floor plans (not bid set of documents of floor plans), noting size and type of restraint to be used.

- e. Show details of supports, hangers, anchorage, and bracing for isolated equipment as designed or proposed by professional engineer employed by Restraint Manufacturer and qualified with seismic experience in bracing for mechanical equipment. Shop drawings submitted for seismic bracing and anchors shall bear engineer's signed professional seal.
- f. Include anchor bolt calculations, signed and stamped by registered engineer, showing adequacy of bolt sizing and type.
 - 1) Calculations shall include anchor embedment, minimum edge distance and minimum center distance.
 - 2) Design lateral forces shall be distributed in proportion to mass distribution of equipment.
 - 3) Furnish calculations for anchors on restraint devices, cable, isolators, and on rigidly mounted equipment.

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

- 1. System design and installation shall meet seismic requirements as defined in ASCE/SEI 7-10, 'Minimum Design Loads for Buildings and Other Structures' and applicable state and local codes in accordance with minimum restraint capability of 1.0 g.
- 2. All products must be California certified/approved and labeled:

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Manufacturers:

- 1. Type One Acceptable Manufacturers:
 - a. Amber / Booth Company, Houston, TX www.amberbooth.com.
 - b. Mason Industries Inc, Hauppauge, NY www.mason-ind.com.
 - c. Vibration Mountings and Control Inc, Bloomington, NJ (201) 838-1780.
 - d. Equal as approved by Architect before bidding. See Section 01 6200.

B. Performance:

- 1. Design Criteria:
 - a. Seismic Requirements: Mechanical equipment, piping, and ductwork shall be braced, snubbed, or supported to withstand seismic disturbances and remain operational.
 - b. Vibration Isolation Requirements: Isolate equipment from structure by means of resilient vibration and noise isolators.

C. Materials:

- 1. Isolation And Seismic Equipment:
 - a. Piping:
 - 1) Restrain piping in accordance with ANSI/SMACNA 001 Seismic Restraint Manual, Chapter 4, Figures 4.11 to 4.19.
 - b. Equipment with Fixed Anchor or Support:
 - 1) Restraint designed according to ASCE/SEI 7-10, Chapter 13, 'Seismic Design Requirements For Nonstructural Components'.
 - 2) Horizontal force factor for elements of structures:
 - a) In addition, vertical force restraint requirement shall be computed at 1/2 value of horizontal forces.
 - b) Restrain equipment not anchored directly to floors by cable system designed and furnished by Restraint Manufacturer.
- 2. Vibration Isolation Requirements:
 - a. Unless otherwise noted, isolate plumbing equipment one horsepower and over from structure by means of resilient vibration and noise isolators in accordance with ASHRAE 'Handbook - HVAC Applications', Chapter 48, Table 47, 'Selection Guide for Vibration Isolation'.
 - b. Design and install isolation equipment, hangers, connections, and other isolating devices to prevent transmission of vibration to structure from equipment and associated piping and ductwork.
 - c. For floor-mounted equipment, use recommendations of Chapter 48, Table 47, 'Selection Guide for Vibration Isolation'.
 - d. For roofs and floors constructed with open web joints, thin long span slabs, wooden construction and unusual light weight construction, evaluate equipment weighing more than 300 lbs to determine additional deflection of structure caused by equipment weight. Isolator deflection shall be 15 times additional deflection or deflection shown in Chapter 48, Table 47, 'Selection Guide for Vibration Isolation', whichever is greater.

- e. Under-Equipment Spring Isolators:
 - 1) Equal to Mason SSLFH earthquake motion restrained spring mounts with freestanding stable steel springs, leveling bolts, corrosion resistant finish, motion limiting design, uplift restraining bolts, and 1/4 inch ribbed neoprene noise stop pad.
 - 2) Isolators shall accept force in any direction up to 1.0 g without failure, and shall limit movement to 3/4 inch in any direction.
 - 3) Springs shall have 50 percent overload capacity.
 - 4) Size as required to achieve specified static deflection.
 - 5) Outer diameter of spring proper shall not be less than 0.08 inch of spring height when in loaded position.
 - f. Overhead Support Spring And Rubber Hangers:
 - 1) Combination spring and neoprene hangers.
 - 2) Hanger bracket shall have 500 percent overload capability and shall allow up to 15 degree hanger rod misalignment without short-circuiting.
 - 3) Springs shall have 50 percent overload capacity.
 - 4) Provide seismic bracing as required.
 - g. Isolate piping and ductwork in mechanical equipment room and piping and ductwork three supports away or 50 feet from other mechanical equipment, whichever is greater, from structure by means of vibration and noise isolators:
 - 1) Isolate suspended piping with combination spring and fiberglass hangers in supporting rods.
 - 2) Support floor-mounted piping directly on spring mounts.
 - h. Isolate vertical pipe risers from structure using vibration and noise isolating expansion hangers having minimum rated deflection of four times anticipated pipe movement. Enclose in housing for fail-safe equipment.
 - i. Incorporate flexible connectors in piping adjacent to reciprocating equipment.
 - j. Incorporate flexible connections in ductwork adjacent to air-moving units.
 - k. Elastomeric Isolator: Neoprene or high quality synthetic rubber with anti-ozone and anti-oxidant additives.
 - l. Nuts, Bolts, And Washers: Electroplated zinc.
 - m. Isolators Exposed To Weather: Cadmium plated and neoprene coated springs.
 - 3. Seismic restraint equipment and resilient isolation devices shall be designed and furnished by single Manufacturer.
- D. Finishes:
- 1. Clean and paint steel components:
 - a. Thoroughly clean structural steel bases of welding slag and prime with zinc-chromate or metal etching primer.
 - b. Etch and paint hot dipped galvanized steel components.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Isolation Equipment:
 - 1. Mount vibration isolated equipment on rigid steel frames or concrete bases unless Equipment Manufacturer certifies direct attachment capability.
 - 2. Install snubbers with factory set clearances.
 - 3. Piping:
 - a. Protect isolated and non-isolated piping 2-1/2 inches inside diameter and larger in all planes by restraints to accommodate thermal movement as well as restrain seismic motions.
 - b. Locations shall be as scheduled and include, but not be limited to:
 - 1) At drops to equipment and at flexible connections.
 - 2) At 45 degree or greater changes in direction of pipe.
 - 3) At horizontal runs of pipe 30 feet maximum on center spacing.
 - 4) Gas piping shall have additional restraints as scheduled.
 - 4. Ductwork:
 - a. Protect isolated and non-isolated rectangular ductwork 4 sq ft in cross-sectional area and larger in all planes by restraints to accommodate thermal movement as well as restrain seismic motion.
 - b. Locations shall be determined by Seismic Restraint Manufacturer and include, but not be limited to:
 - 1) Horizontal runs of ductwork 30 feet maximum on center spacing.
 - 2) 45 degree or greater changes in direction of ductwork.

- 3) Each end of duct runs and drops of equipment.
 - 4) Each flexible connection.
- B. Vibration Isolation:
 1. Install piping and ductwork to prevent transmission of noise and vibration into structure.

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:
 - a. Equipment Identification:
 - 1) Black formica, with white reveal when engraved.
 - 2) Lettering to be 3/16 inch high minimum.
 2. 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.
 - c. Provide pipe markers as follows:
- | Pipe Use | Abbreviation |
|----------------------------------|--------------|
| Domestic Hot Water | HW |
| Domestic Hot Water Recirculation | HW RECIRC |
| Domestic Cold Water | CW |
| Roof Drains | RD |
| Sanitary Vent | SV |
| Relief Vent | RV |
3. Tags:
 - a. Regardless of size, each valve shall have brass tag 1-1/2 inches by 3 inches minimum in size and 0.051 inch thick.

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. 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.

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.
 - 2. Furnish and install insulation on roof drain piping as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 22 1116: 'Domestic Water Piping'.
 - 2. Section 22 1400: 'Facility Storm Drainage'.

PART 2 - PRODUCTS**2.1 COMPONENTS**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Armacell, Mebane, NC www.armacell.com.
 - b. Childers Products Co, Eastlake, OH www.fosterproducts.com.
 - c. IMCOA, Youngsville, NC www.nomacokflex.com.
 - d. Johns-Manville, Denver, CO www.jm.com.
 - e. Knauf, Shelbyville, IN www.knauffiberglass.com.
 - f. Nomaco Inc, Yopungsville, NC www.nomacokflex.com.
 - g. Owens-Corning, Toledo, OH www.owenscorning.com.
 - h. Speedline Corp, Solon, OH 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
170 - 180 Deg F	One In	1-1/2 In	2 In
140 - 160 Deg F	1/2 In	One In	1-1/2 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.
- 5. PVC or ABS Piping, Above And Below Grade - Facility Storm Drain:
 - 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. Piping up to 1-1/4 inch Diameter:
 - a. Adhere 'factory applied vapor barrier jacket lap' smoothly and securely at longitudinal laps with white vapor barrier adhesive.
 - b. Adhere 3 inch wide self-sealing butt joint strips over end joints.
 - 4. Piping 1-1/2 inches Diameter And Larger:
 - a. Use broken-joint construction in application of two-layer covering.
 - b. Fill cracks and depressions with insulating cement mixed to thick plastic paste.
 - 1) Apply by hand in several layers to make up total specified thickness.
 - 2) Final layer shall have smooth uniform finish before application of covering.
 - 5. Fittings, Valves, And Accessories:
 - a. Do not apply insulation over flanged joints or victaulic couplings until piping has been brought up to operating temperature and flange bolts have been fully tightened. Insulate valves so wheel, stem, and packing nut are exposed.
 - b. 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.

- c. Piping Up To 1-1/4 Inch (Diameter:
 - 1) Cover insulation with one piece fitting cover secured by stapling or taping ends to adjacent pipe covering.
 - 2) Alternate Method:
 - a) 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.
 - d. Piping 1-1/2 inches To 2 Inches:
 - 1) Insulate with hydraulic setting insulating cement or equal, to thickness equal to adjoining pipe insulation.
 - 2) Apply final coat of fitting mastic over insulating cement.
 - e. Piping 2-1/2 inch And Larger:
 - 1) Insulate with segments of molded insulation securely wired in place and coated with skim coat of insulating cement.
 - 2) Apply fitting mastic, fitting tape and finish with final coat of fitting mastic.
 - 6. Pipe Hangers:
 - a. Do not allow pipes to come in contact with hangers.
 - b. Pipe Shield:
 - 1) Provide schedule 40 PVC by 6 inch 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.
 - c. At Pipe Hangers:
 - 1) Provide rigid calcium silicate insulation (100 psi compressive strength) at least 2 inches beyond shield.
 - 7. Protect insulation wherever leak from valve stem or other source might drip on insulated surface, with aluminum cover or shield rolled up at edges and sufficiently large in area and of shape that dripping will not splash on surrounding insulation.
- 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.
 - 2. Furnish and install potable water piping complete with necessary valves, connections, and accessories inside building and connect with outside utility lines 5 feet from building perimeter as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 22 0501: 'Common Piping Requirements'.
 - 2. Section 22 0719: 'Plumbing Piping Insulation'.
 - 3. Section 31 2316: 'Excavation' for criteria for performance of excavation.
 - 4. Section 31 2323: 'Fill' for criteria for performance of backfill.
 - 5. Section 33 1116: 'Site Water Utility Distribution Piping' for domestic water piping from 5 feet from building perimeter to main.

1.2 REFERENCES

- A. Reference Standards:
 - 1. American National Standards Institute / American Society of Sanitary Engineers:
 - a. ANSI/ASSE 1003-2009, 'Water Pr. Reduce 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, 'Std 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'.
 - 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 SUBMITTALS

- A. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. Written report of sterilization test.

1.4 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.
 - 2. California only: California Assembly Bill 1953 (AB1953) Compliant for Lead Free

1.5 WARRANTY

- A. Manufacturer Warranty:
 - 1. Manufacturer's Warranty covering property damage caused by defective product including renovation costs or replacement costs.

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

- a. Acorn Controls, City of Industry, CA www.acorneng.com
- b. Cash Acme, Cullman, AL www.cashacme.com
- c. Chicago Faucets, Des Plaines, IL, www.chicagofaucets.com.
- d. Cla-Val Company, Costa Mesa, CA.
- e. Conbraco Industries Inc, Matthews, NC www.conbraco.com.
- f. Hammond Valve, New Berlin, WI www.hammondvalve.com.
- g. Handy & Harmon Products Div, Fairfield, CT www.handyharmon.com (800) 463-1465.
- h. Harris Products Group, Cincinnati, OH www.harrisproductsgroup.com.
- i. Honeywell Inc, Minneapolis, MN www.honeywell.com.
- j. Milwaukee Valve Co, New Berlin, WI www.milwaukeevalve.com.
- k. Nibco Inc, Elkhart, IN www.nibco.com.
- l. Rehau, Leesburg, VA www.rehau-na.com.
- m. Sloan Valve Co, Franklin Park, IL www.sloanvalve.com.
- n. Spence Engineering Co, Walden, NY www.spenceengineering.com.
- o. Symmons Industries, Braintree, MA www.symmons.com.
- p. Uponor Inc, Apple Valley, MN www.uponor-usa.com.
- q. Viega ProPress, Wichita, KS www.viega-na.com.
- r. Watts Regulator Co, Andover, MA www.wattsreg.com.
- s. Wilkins (Zurn Wilkins), Paso Robles, CA www.zurn.com.
- t. Zurn PEX, Inc., Commerce, TX 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 minimum under slabs.
 - b) 2 inches And Smaller: Annealed soft drawn.
 - c) 2-1/2 inches And Larger: Hard Drawn.

3. Fittings:

- a. For Copper Pipe: Wrought copper.

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. 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 SWP.
 - 1) Operate with flow in either direction, suitable for throttling and tight shut-off.
 - 2) Body: Bronze, 150 psig wsp at 350 deg F and 400 psig wog.
 - 3) Seat: Bubble tight at 100 psig under water.
- c. Class One Quality Standard: Nibco T585 or S585.
 - 1) Equal by Conbraco 'Apollo,' Hammond, Milwaukee, or Watts.
- 6. Combination Pressure Reducing Valve / Strainer:
 - a. Integral stainless steel strainer, or separate 'Y' strainer installed upstream of pressure reducing valve.
 - b. Meet ANSI/ASSE 1003 requirements.
 - c. Built-in thermal expansion bypass check valve.
 - d. Class One Quality Standard: Watts LFU5B:
 - 1) Equal by Cash Acme, Cla-Val Hi Capacity, Conbraco 36C, Honeywell-Braukmann, Spence Hi Capacity, Watts, or Wilkins. See Section 01 6200.
- 7. Mixing Valve:
 - 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 11 GPM with maximum 10 psi pressure drop. Perform to minimum flow of 0.5 GPM in accordance with ASSE 1017.
 - d. Set for 110 deg F Service.
 - e. Match Construction Drawings for connection sizes.
 - f. Class One Quality Standard: Powers LFMM430. See Section 01 6200.
 - g. Acceptable Manufacturers: Acorn, Chicago Faucets, Leonard, Powers, Sloan, Symmons, and Watts.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate cold water lines a minimum of 6 inches 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 hydrostatic pressure for four (4) hours and show no leaks.
 - 2. Disconnect equipment not suitable for 125 psig pressure from piping system during test period.

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 1119
DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install miscellaneous potable water piping specialties as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 22 0501: 'Common Plumbing Requirements'.

1.2 REFERENCES

- A. Reference Standards:
 - 1. NSF International Standard / American National Standards Institute:
 - a. NSF/ANSI 61-2014a, 'Drinking Water System Components - Health Effects'.
 - b. NSF/ANSI 372-2011, '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.

PART 2 - PRODUCTS**2.1 ACCESSORIES**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Ashcroft, Stratford, CT www.ashcroftinc.com.
 - b. Febco, Denver, CO www.repmasters.com.
 - c. H O Trerice, Oak Park, MI www.hotco.com.
 - d. IPS Corporation, Compton, CA www.ipscorp.com.
 - e. Josam Co, Michigan City, IN www.josam.com.
 - f. Jay R. Smith Manufacturing Co, Montgomery, AL www.jrsmith.com.
 - g. Mifab Manufacturing Inc, Chicago, IL www.mifab.com.
 - h. Oatey, Cleveland, OH www.oatey.com.
 - i. Powers, North Andover, MA or Burlington ON www.powers.com.
 - j. Precision Plumbing Products (PPP), Portland, OR www.pppinc.net.
 - k. Prier Products, Inc., Grandview, MD www.prier.com.
 - l. Proset Systems Inc., Lawrenceville, GA www.prosetsystems.com.
 - m. Sioux Chief Manufacturing Co, Peculiar, MO www.sioxchief.com.
 - n. Sure Seal, Tacoma, WA www.thesureseal.com.
 - o. Wade (Division of Tyler Pipe), Tyler, TX www.wadedrains.com.
 - p. Watts Drainage, Spindale, NC www.watts.com.
 - q. Weiss Instruments, Inc., Holtsville, NY www.weissinstruments.com.
 - r. Woodford Manufacturing, Colorado Springs, CO www.woodfordmfg.com.
 - s. Zurn Cast Metals, Erie, PA www.zurn.com.
- B. Materials:
 - 1. Trap Guard Trap Seal:
 - a. Design Criteria:
 - 1) Not required to meet NSF International Standards for Lead Free.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Trap Guard by Proset:
 - a) Install per Manufacturer's recommendations.
 - 2) Sure Seal by Sure Seal:
 - a) Install per Manufacturer's recommendation.
 - 2. Pressure Reducing Station:
 - a. Design Criteria:
 - 1) Meet NSF International Standards for Lead Free.
 - b. Pressure Gauges:
 - 1) Gauges shall have following features:
 - a) Cast aluminum case.
 - b) Chrome plated ring.
 - c) Impact resistant window.

- d) Phosphor bronze alloy steel bourdon tube.
 - e) 1/2 percent scale range accuracy.
 - f) 4-1/2 inch diameter dial face.
 - g) Range 0 to 100 psig.
 - 2) Class One Quality Standard: 500X by H O Trerice.
 - a) Equal by Ashcroft or Weiss. See Section 01 6200.
 - c. Brass Gauge Cocks:
 - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) 1092 by Ashcroft.
 - b) 865 by H O Trerice.
3. Exterior Hydrants:
- a. Design Criteria:
 - 1) Provide with integral anti-siphon device. Key-operated.
 - 2) Non-freeze.
 - 3) Not required to meet NSF International Standards for Lead Free.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Josam: 71050.
 - 2) Jay R. Smith: 5609-QT.
 - 3) Prier: C-634.
 - 4) Wade: W-8600.
 - 5) Watts: HY-725.
 - 6) Woodford: 67.
 - 7) Zurn: Z-1310.
4. Rest Room:
- a. Design Criteria:
 - 1) Provide with integral anti-siphon device and stainless steel face. Key-operated.
 - 2) Not required to meet NSF International Standards for Lead Free.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Josam: 71070.
 - 2) Mifab: MHY-30.
 - 3) Prier: C-255CP.75.
 - 4) Watts: HY-430
 - 5) Zurn: Z-1333.
5. Water Hammer Arrestors:
- a. Design Criteria:
 - 1) Meet NSF International Standards for Lead Free.
 - 2) Nesting type, air pre-charged bellows with casing.
 - 3) Bellows constructed of stabilized 18-8 stainless steel.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Josam: 75003.
 - 2) Jay R. Smith: 5020.
 - 3) Sioux Chief: 650 Series.
 - 4) Wade: 20.
6. Thermometer Gauge:
- a. Design Criteria:
 - 1) 3-Color Dial.
 - 2) Size: 3 inch.
 - 3) Stainless Steel.
 - 4) Temperature Range: 0 deg F to 200 deg F.
 - b. Class Two Quality Standard: Model 894-3709 by Powers.
 - 1) Equal product that meets Design Criteria. See Section 01 6200.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Gauges: Connect to pipe with 1/4 inch connections utilizing gauge cocks.

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 within building and connect with outside utility lines 5 feet out from building where applicable.
 - 2. Perform excavation and backfill required by work of this Section.
- B. Related Requirements:
 - 1. Section 07 8400: 'Firestopping' for quality of firestopping material.
 - 2. Section 22 0501: 'Common Plumbing Requirements'.
 - 3. Section 22 1319: 'Facility Sanitary Sewer Specialties' for furnishing of sewer specialties.
 - 4. Section 31 2316: 'Excavation' for criteria for performance of excavation.
 - 5. Section 31 2323: 'Fill' for criteria for performance of backfill and compaction.
 - 6. Section 33 3313: 'Sanitary Utility Sewerage' for sewage piping from 5 feet out from building to main.

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. ASTM International:
 - a. ASTM D2235-04(2011), 'Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings'.
 - b. ASTM D2321-14, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'.
 - c. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
 - d. ASTM D3034-14, 'Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings'.
 - e. ASTM F628-12, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe With a Cellular Core'.
 - f. ASTM F656-15, 'Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings'.
 - g. ASTM F891-10, 'Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core'.
 - 2. International Code Council:
 - a. ICC IPC-2015, 'International Plumbing Code'.

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Performance:
 - 1. Design Criteria:
 - a. Minimum size of waste piping installed under floor slab on grade shall be 2 inches.
- B. Materials:
 - 1. 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. 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 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.
 - 3. Cleanouts:
 - 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 fall in one foot 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. 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 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.
 - 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 or diameter of pipe plus 12 inches, whichever is greater.
 - 2) Maximum: Outside diameter of pipe plus 24 inches.
 - f. Do not use backhoe or power equipment to assemble pipe.

- g. Initial backfill shall be 12 inches 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 before wheel loading.
 - 2) 48 inches before compaction.
- C. Install piping so cleanouts may be installed as follows:
 - 1. At every 135 degrees of accumulative change in direction for horizontal lines.
 - 2. Every 100 feet of horizontal run.
 - 3. 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.
- D. 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.
- E. 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 minimum above roof and 12 inches minimum from any vertical surface.
 - 2. Same size as vent pipe.
 - 3. In areas where minimum design temperature is below 0 deg F 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 in diameter.
 - b. Vents shall terminate 10 inches minimum above roof or higher if required by local codes.
- F. Furnish and install firestopping at penetrations of fire-rated structures as required under Sections 07 8400 and 22 0501.
- G. 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. Thermoplastic Pipe System:
 - a. Before backfilling and compacting of trenches, Fill waste and vent system with water to roof level or 10 feet 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 1119: 'Domestic Water Piping Specialties'.
 - 4. 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. H-M Company, Cincinnati, OH www.draintroughs.com.
 - b. Josam Co, Michigan City, IN www.josam.com.
 - c. Jay R. Smith Manufacturing Co, Montgomery, AL www.jrsmith.com.
 - d. Mifab Manufacturing Inc, Chicago, IL www.mifab.com.
 - e. Precision Plumbing Products (PPP), Portland, OR www.pppinc.net.
 - f. Sioux Chief Manufacturing Co, Peculiar, MO www.siuoxchief.com.
 - g. Wade Div Tyler Pipe, Tyler, TX www.wadedrains.com.
 - h. Watts Drainage, Spindale, NC www.watts.com.
 - i. Zurn Industries, LLC, Erie PA www.zurn.com.
- 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:
 - 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:
 - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Same as Floor Drain FD-1, except with funnel top.
 - b) Mifab: F-1100-C-EF.
 - 2. Drain Trough:
 - a. Polypropylene, 1/4 inch thick body with 3/8 inch thick lid. 48 inches long by 12 inches high by 18 inches wide with 2 inch drain and integral lint filter.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) HM Company.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 22 3305
ELECTRIC DOMESTIC WATER HEATERS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install electric water heater as specified in Contract Documents.
- B. Related Requirements:
 - 1. Section 22 0501: 'Common Plumbing Requirements'.
 - 2. Section 22 1116: 'Domestic Water Piping'.

1.2 REFERENCES

- A. Reference Standard:
 - 1. 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 SUBMITTALS

- A. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Maintenance and operational instructions.
 - b. Warranty Documentation:
 - 1) Final, executed copy of Warranty.
 - c. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature or cut sheet.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Meet NSF International Standards for materials or products that come in 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.
 - 2. California only: California Assembly Bill 1953 (AB1953) Compliant for Lead Free.

1.5 WARRANTY

- A. Special Warranty:
 - 1. Three-year non-prorated warranty on water heaters of 20 gallon capacity and larger.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. American Water Heater Co, Johnson City, TN www.americanwaterheater.com.
 - b. A O Smith Water Products Co, Ashland City, TN www.hotwater.com (800) 265-8520.
 - c. Bradford-White Corp, Ambler, PA www.bradfordwhite.com.
 - d. Lochinvar, Lebanon, TN www.lochinvar.com.
 - e. Rheem / Ruud Water Heater Div Rheem Manufacturing, Atlanta, GA www.rheem.com (800) 268-6966.
 - f. State Industries Inc, Ashland City, TN www.stateind.com.
- B. Materials:
 - 1. Design Criteria:
 - a. All (wetted) drinking water products, components, and materials used in drinking water systems must meet NSF International Standards for Lead Free.
 - b. All water heaters require 'Tempered Water Temperature Control' (mixing valves) as specified in Section 22 1116.
 - 2. 19 / 20 Gallon:
 - a. Glass lined storage tank pressure tested and rated for 125 psi working pressure.
 - b. 110-120 V, single phase, 1500 - 1650 watts maximum heating capacity.
 - c. Water heaters shall each have ASME rated temperature-pressure relief valve rated at MBH input of heater minimum set to relieve at 120 psi.
 - d. Complete with thermostat, high limit control, and anode rod.
 - e. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) American: E61-19L-045DV.
 - 2) A O Smith: DEL-20.

- 3) Bradford White: LE120L3-3 or LE120U3-1.
- 4) Lochenvar: JRC020DS or JTC020DS (both 1650 watts).
- 5) Rheem: 81VP20S or EGSP20.
- 6) State Industries: PCE-20.

2.2 ACCESSORIES

- A. Anchoring Components:
 1. One inch (by 18) galvanized steel straps.
 2. No. 10 by 2-1/2 inch screws.
- B. Thermal Expansion Absorbers:
 1. Bladder type for use with potable water systems.
 2. Type One Acceptable Products.
 - a. Therm-X-Trol ST-12-C by Amtrol Inc, West Warwick, RI www.amtrol.com.
 - b. Equal as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install temperature-pressure relief valve on hot water heater and pipe discharge to directly above mop sink.
- B. Anchor 20 gallon and larger water heaters to wall using anchoring straps and specified screws.

3.2 ADJUSTING

- A. Set discharge water temperature at 140 deg F (. Final hot water temperature shall be 110 deg F after thermostatic mixing valve. If no mixing valve set discharge temperature at 110 deg F

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).
- 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.
 - b. AMTC - Advanced Modern Technologies Corp, Woodland Hills, CA www.amtcorporation.com.
 - c. Bemis Manufacturing Co, Sheboygan Falls, WI www.bemismfg.com.
 - d. Beneke by Sanderson Plumbing Products, Columbus, MS www.sppi.com.
 - e. Church Seat Co, Sheboygan Falls WI www.churchseats.com.
 - f. Delany Flush Valves, Charlottesville, VA www.delanyproduct.com.
 - g. Delta Faucet Co, Indianapolis, IN www.deltafaucet.com.
 - h. Dearborn Brass, Cleveland, OH www.dearbornbrass.com.
 - i. Gerber Plumbing Fixtures LLC, Woodridge, IL www.gerberonline.com.
 - j. Josam Co, Michigan City, IN www.josam.com.
 - k. Jay R. Smith Mfg. Co, Montgomery, AL www.jrsmith.com.
 - l. Kohler Co Plumbing Div, Kohler, WI www.us.kohler.com.
 - m. McGuire Manufacturing Co, Cheshire, CT www.mcguiremfg.com.
 - n. Mifab Manufacturing Inc, Amherst, NY www.mifab.com.
 - o. Moen Incorporated, North Olmsted, OH, www.moen.com.
 - p. Olsonite Corp, Newnan, GA www.olsonite.net.
 - q. Sloan Valve Co, Franklin Park, IL www.sloanvalve.com.
 - r. South Fork Manufacturing, Coalville, UT (801) 953-3001 www.dirt-grabber.com.
 - s. Toto U.S.A., Inc., Morrow, GA www.totousa.com.
 - t. Wade Div Tyler Pipe, Tyler, TX www.wadedrains.com.
 - u. Watts Drainage, Spindale, NC www.wattsdrainage.com.
 - v. Zurn Industries, LLC, Erie PA www.zurn.com.
- 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.
 - d. Do not use toilets with effective flush volume of less than 1.28 gallons.

C. Materials:

1. Water Closets:

a. Floor Mounted (Top Spud) with matched Flush Valve:

1) Standard Fixture:

- a) Water usage of 1.6 gallons per flush.
- b) Battery operated.
- c) MaP Score of 1000 grams.
- d) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) American Standard: Madera FloWise Elongated 3451.00 (water closet) with American Standard 6065.161.002 (flush valve) battery.
 - (2) Kohler: Wellworth K-4406 with Tripoint DC 1.6 GPF WC Flushometer K-10957-SV.
 - (3) Sloan ST-2009-A with flushometer Sloan G2 OPTIMA Plus 8111-1.6.

2) Handicap Accessible Fixture:

- a) Water usage of 1.6 gallons per flush.
- b) 18 inch maximum rim height.
- c) Battery operated.
- d) MaP Score of 1000 grams.
- e) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) American Standard: Madera FloWise Elongated 3461.001 with Flushometer American Standard 6065.161.002.
 - (2) Kohler: Highline EL ADA K-4405 with Tripoint DC 1.6 GPF WC Flushometer K-10957-SV.
 - (3) Sloan ST-2029-A with flushometer Sloan G2 OPTIMA Plus 8111-1.6.

2. Water Closet Accessories:

a. Flush Valves:

- 1) Water Closets must have required flush valves.

b. 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.

c. Flush Valve Filter:

- 1) Required in following flush valves:
 - a) Sloan.
 - b) Zurn.
- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) SFDG1 'Dirt Grabber' by South Fork Manufacturing.

3. Urinals:

a. Standard Fixture (wall mount Flush Valve, mount standard height or ADA mounting height):

- 1) Water usage of 1.0 gallons per flush.
- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) American Standard: Washbrook FloWise 6590.001.
 - b) Gerber: Monitor 27-780or 27-730.
 - c) Kohler: Bardon K-4904-ET.
 - d) Sloan SU-1006-1.0.
 - e) Toto: UT447E.

b. HEU (High-Efficiency Urinal) - Standard Fixture:

- 1) Water usage of 0.5 gallons per flush.
- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) American Standard: Washbrook FloWise 6590.001.
 - b) Gerber: Monitor 27-730.

- c) Kohler: Bardon K-4904-ET.
 - d) Sloan SU-1009.
 - e) Toto: UT447E.
- c. HEU (High-Efficiency Urinal) (If required by code and AHJ):
 - 1) Water usage of 0.125 gallons (pint) per flush.
 - 2) Required for all California Projects.
 - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) American Standard: Washbrook FloWise 6590.001.
 - b) Kohler: Bardon K-4904-ET.
 - c) Sloan SU-1009.
 - d) Toto: UT445U.
- 4. Urinal Accessories:
 - a. Carrier / Support:
 - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Josam.
 - b) Jay R. Smith.
 - c) Mifab.
 - d) Wade.
 - e) Zurn.
 - b. Flush Valve:
 - 1) HEU (High-Efficiency Urinal) - Standard:
 - a) Proximity sensor type with battery.
 - b) Low flow, 0.5 gallon per flush maximum.
 - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) American Standard 6063.051.
 - (2) Delany: PL 1451-0.5.
 - (3) Delta: 81T231BTA factory set to 0.5 gallons per flush.
 - (4) Moen: 8315.
 - (5) Sloan: 8186-0.5.
 - (6) Zurn: ZER6003AV-EWS with maintenance override button.
 - 2) HEU (High-Efficiency Urinal):
 - a) Required for all California Projects (If required by code and AHJ).
 - b) Proximity sensor type with battery.
 - c) Low flow, 0.125 gallons (pint) per flush maximum.
 - d) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) American Standard 6063.013.
 - (2) Delany: PL 1451-0.125PL.
 - (3) Delta: 81T231BTA-05 factory set to 0.125 gallons (0.5 liter) per flush.
 - (4) Moen: 8316.
 - (5) Sloan: 8186-0.125.
 - (6) Zurn: ZEMS6003AV-ULF-CP with maintenance override button.
 - c. Flush Valve Filter:
 - 1) Required in following flush valves:
 - a) Sloan.
 - b) Zurn.
 - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) SFDG1 'Dirt Grabber' by South Fork Manufacturing.

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'.
 - 2. Attach wall-hung fixtures to carriers.
 - 3. Support fixture hanger or arm free of finished wall.
- C. Adjust flush valves for proper flow.
- D. Provide each individual fixture supply with accessible chrome-plated stop valve with hand wheel.

- E. Urinals: Install with accessible stop or control valve in each branch supply line.
- F. Mounting:
 - 1. Urinals:
 - a. Standard: 24 inches from floor to bottom lip.
 - b. Handicap Accessible: 17 inches maximum from floor to bottom lip.
- G. 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.
- H. Flush Valve Filters:
 - 1. Install in Sloan and Zurn only flush valves.
 - 2. Install after water lines have been flushed out, but before turning water into flush valve.

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 09 7720: 'Decorative Fiberglass Reinforced Wall Panels (FRP)' used at walls where service sink is located.
 - 3. Section 22 0501: 'Common Plumbing Requirements'.
 - 4. 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'.
 - b. ASME A112.6.7-2010 (R2015), 'Sanitary Floor Sinks'.
 - c. ASME A112.19.1-2013/CSA B45.2-13, 'Enamelled cast iron and enamelled steel plumbing fixtures'.
 - d. ASME A112.19.3-2008/CSA B45.4-08 (R2013), 'Stainless steel plumbing fixtures'.
 - 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.
 - 2. California only: California Assembly Bill 1953 (AB1953) Compliant for Lead Free.

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.
 - b. Brocar Products Inc, Cincinnati, OH www.brocar.com.
 - c. CECO, Huntington Park, CA www.cecossinks.com.
 - d. Chicago Faucet Co, Des Plaines, IL www.chicagofaucets.com.
 - e. Dearborn Brass, Tyler, TX www.dearbornbrass.com.
 - f. Delta Faucet Co, Indianapolis, IN www.deltafaucet.com.
 - g. Engineered Brass Co. (EBC) (Just Manufacturing Co.), Franklin Park, IL www.justmfg.com.
 - h. Elkay Manufacturing Co, Oak Brook, IL www.elkay.com.
 - i. Gerber Plumbing Fixtures LLC, Woodridge, IL www.gerberonline.com.
 - j. Josam Co, Michigan City, IN www.josam.com.
 - k. Jay R. Smith Manufacturing Co, Montgomery, AL www.jrsmith.com.
 - l. Just Manufacturing Co, Franklin Park, IL www.justsinks.com.
 - m. Keeney Manufacturing Co, Newington, CT www.keeneymfg.com.
 - n. Kindred USA, Midland, ON www.kindred-sinkware.com.
 - o. Kohler Co Plumbing Div, Kohler, WI www.us.kohler.com.

- p. McGuire Manufacturing Co, Cheshire, CT www.mcguiremfg.com.
 - q. Mifab Manufacturing Inc, Amherst, NY www.mifab.com.
 - r. Moen Incorporated, North Olmsted, OH, www.moen.com.
 - s. Omni Flow Controls, Harbor City, CA www.chronomite.com or www.omniflowcontrols.com.
 - t. Plumberex Specialty Products, Palm Springs, CA www.plumberex.com.
 - u. Sloan Valve Co, Franklin Park, IL www.sloanvalve.com.
 - v. Speakman Company, New Castle, DE www.speakmancompany.com.
 - w. Symmons, Braintree, MA www.symmons.com.
 - x. T & S Brass & Bronze Works Inc, Travelers Rest, SC www.tsbrass.com.
 - y. Wade Div Tyler Pipe, Tyler, TX www.wadedrains.com.
 - z. Watts Drainage, Spindale, NC www.wattsdrainage.com.
 - aa. Zurn Commercial Brass, Sanford, NC www.zurn.com.
 - bb. Zurn Cast Metal, Erie, PA 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. Floor Sinks (Sanitary) shall conform to requirements of ASME A112.6.7.
 - d. 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 and Handicap Accessible Counter Top Lavatories:
 - 1) Size 20 by 17 inches 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. Standard and Handicap Accessible Self Supporting Lavatories:
 - 1) Size: 20 by 18 inches nominal.
 - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) American Standard: Lucern 0355.012.
 - b) Kohler: Greenwich K-2032.
 - 3) Carrier / Support:
 - a) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Josam: 17100.
 - (2) Jay R. Smith: 0700.
 - (3) Mifab: MC-41.
 - (4) Wade: 520-M36.
 - c. Lavatory Fittings:
 - 1) Faucet and Drain:
 - a) Design Criteria:
 - (1) Meet NSF International Standards for Lead Free.
 - (2) Battery-operated automatic faucet.
 - b) Accessories:
 - (1) Cast brass spout.
 - (2) 4 inches cover plate.
 - (3) Single supply configuration.
 - (4) Solenoid valve.
 - (5) Control module and transformer.
 - (6) Hermetically sealed electronics.
 - (7) In-line filter.

- c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Chicago: 116.405.21.1 with 4" CC E-tronic and 327A strainer.
 - (2) Delta: 591T0250 WITH 33T260 grid strainer and R2900 mixing valve.
 - (3) Gerber: 44-804-4 with 43-970 grid strainer.
 - (4) Moen: 8305 with McGuire 155A grid strainer.
 - (5) Sloan: EBF-650 with ETF-460A strainer.
 - (6) Speakman: S-8710 with S-3440 grid drain.
 - (7) Symmons: S-6080-G with grid strainer.
 - (8) Zurn: Z6913-SSH with 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 0.5 gpm.
 - c) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - (1) Omni L-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 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 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 Handicap 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.
- 2. Stainless Steel Sinks And Fittings:
 - a. Design Criteria:
 - 1) Not required to meet NSF International Standards for Lead Free.
 - 2) Self-rimming, 18 gauge stainless steel, satin finish.
 - b. Single Compartment Sink:
 - 1) Description:
 - a) Size: 22 by 19.5 inches nominal.
 - 2) Design Criteria:
 - a) Not required to meet NSF International Standards for Lead Free.

- 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Elkay: LR-2219.
 - b) Just: SL-1921-AG-R.
 - c) Kindred: LBS 4008P-1.
- c. Stainless Steel Sink Fittings:
 - 1) Faucets for Standard Double and Single Compartment 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: Heritage/Amarilis Two-Handle Bottom-Mount Kitchen Faucet with Swivel spout 7270.
 - (2) Chicago: 1888CP.
 - (3) Delta: 27C2243-S5.
 - (4) Gerber: CO-44-002.
 - (5) Kohler: K-7761-K with handles K-16012-5.
 - (6) Zurn Commercial Brass: Z-831J3.
 - 2) 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 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.
 - 3) 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.
 - 4) Waste For Standard Stainless Steel Sinks:
 - a) Design Criteria:
 - (1) Not required to meet NSF International Standards for Lead Free.
 - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Elkay: LK-99.
 - (2) Kindred: 1130.
 - (3) Kohler: K8801.
 - (4) McGuire: 151.
 - (5) Zurn Z-8740-PC.
 - 5) Trap:
 - a) Description:
 - (1) 17 gauge 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: MCT150075NCZN.
 - (5) Zurn.

3. Miscellaneous Sinks And Fittings:

a. Service Sink:

1) Description:

- a) One piece, precast terrazzo made of black and white marble chips in gray Portland cement.

2) Design Criteria:

- a) Not required to meet NSF International Standards for Lead Free.
- b) Terrazzo construction without dropped-down curb and stainless steel cap.
- c) Color: Grey.

3) Components:

a) Service Basin:

- (1) Neo-corner service basin with plain curbs with galvanized bond flange.
 - (2) Terrazzo surface ground and polished with all air holes or pits grouted and excess removed.
 - (3) Shoulders not less than 12 inch high outside and 10 inch inside at lowest wall. Shoulder width not less than 2 inches on all sides.
 - (4) Stainless steel cast drain body integrally and provides for caulked lead connection not less than 1 inch deep to 3 inch pipe.
 - (5) Integral stainless steel drain assembly and strainer plate.
- b) Wall Guards (protect walls adjacent to service sink):
- (1) Process Area Custodial Room: Two 36 inch wide by 12 inch high heavy gauge stainless steel wall guard panels required at each sink: Model MSG3624.
 - (2) Public Area Custodial Room: Two 32 inch wide by 12 inch high heavy gauge stainless steel wall guard panels required at each sink: Model MSG3232.
 - (3) Family Services Module: Two 24 inch wide by 12 inch high heavy gauge stainless steel wall guard panels required at each sink: Model MSG2424.
- c) Removable Stainless Steel Strainer Plate (at each sink): Model 1453BB.

4) Service Sink Size:

a) Process Area Custodial Room:

- (1) 36 inch by 36 inch by 12 inch Model TSB6002.

b) Public Area Custodial Room:

- (1) 32 inch wide by 32 inch 12 inch Model TSB6001.

c) Family Services Module if included:

- (1) 24 inch wide by 24 inch 12 inch Model TSB6000.

5) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

- a) Neo-corner Series TSBC6000 with plain curbs, MSG series Wall Guards, and Strainer by Fiat Products, Mansfield, OH www.fiatproducts.com.

b. Floor Sink:

1) Description:

- a) Duco cast-iron body with flashing flange, acid resisting porcelain enamel interior, with dome strainer, and 8-1/2 inch square nickel-bronze rim and half grate.
- b) Provide 36 inches by 36 inches by 4 lb/ sq ft lead pan.
- c) Provide deep seal cast iron 'P' trap with clean out.

2) Design Criteria:

- a) Not required to meet NSF International Standards for Lead Free.

3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:

- a) Jay R. Smith: 3100.
- b) Josam: 49000-43.
- c) Mifab: FS-1520-FL-1.
- d) Watts Drainage:
- e) Zurn Cast Metal: Z-1910.

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. Self-Supporting Lavatories: Install using carriers. Support carrier free of finished wall.
- G. Install Safety Covers on all under sink / lavatories with exposed water supply pipes and traps.
- H. Install Handicap Accessible Lavatories as per ADA height mounting requirements.
- I. Service Sink:
 - 1. Follow Manufacture's written instructions including but not limited to the following:
 - a. Install and level terrazzo service basin on 1/2 inch layer of mortar.
 - b. Install wall guard panels over galvanized flange of service sink and over FRP panels on both walls.
 - c. Apply sealant between flanges and wall guard and edges of wall guard.

3.2 CLEANING

- A. Polish chrome finish at completion of Project.

END OF SECTION

SECTION 22 4700
DRINKING FOUNTAINS AND WATER COOLERS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install drinking water cooling system units as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 22 0501: 'Common Plumbing Requirements'.
 - 2. 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. NSF International Standard / American National Standards Institute:
 - a. NSF/ANSI 61-2012, 'Drinking Water System Components - Health Effects'.
 - b. NSF/ANSI 372-2011, 'Drinking Water System Components - Lead Content'.

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Handicap Accessible Products to meet ANSI/ICC A117 Accessible requirements.
 - 2. 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 MANUFACTURED UNITS**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Acorn Aqua, City of Industry, CA www.acornaqua.com.
 - b. Elkay Manufacturing Co, Oak Brook, IL www.elkay.com.
 - c. Halsey Taylor, Oak Brook, IL www.halseytaylor.com.
 - d. Oasis, Tri Palm International, Columbus OH www.oasiswatercoolers.com.
- B. Design Criteria:
 - 1. All drinking water products, components, and materials above and below grade used in drinking water systems must meet NSF International Standards for Lead Free.
 - 2. Interior exposed pipe, valves, and fixture trim shall be chrome plated.
 - 3. Do not use flexible water piping.
- C. Materials:
 - 1. Handicap Accessible Bi-Level Fountain:
 - a. Include accessory fountain. Vandal proof operating bar on front and both sides. 7.8 GPH minimum of 50 deg F water with 90 deg F room temperature, 1/5 horsepower motor, 120 V, 60 Hz, single phase. Flexi-guard or chrome plated brass bubbler.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) AcornAqua: AquaAccess A172408B-UBL.
 - 2) Elkay: Model EZSTL8LC.
 - 3) Halsey Taylor: HAC8FSBL-Q-ADA.
 - 4) Oasis: PG8ACSL.
 - 2. Handicap Accessible Single Fountain:
 - a. Vandal proof operating bar on front and both sides. 7.8 GPH minimum of 50 deg F water with 90 deg F room temperature, 1/5 horsepower compressor motor, 120 V, 60 Hz, single phase. One-piece stainless steel back splash and basin. Flexi-guard or chrome plated brass bubbler.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) AcornAqua: AquaAccess A171108F.
 - 2) Elkay: EZS8L.
 - 3) Halsey Taylor: HAC8FS-Q-ADA.
 - 4) Oasis: P8AC.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install fixtures with accessible stop or control valve.

B. Mounting:

1. General:

- a. Coordinate location of fountain with location and height of electrical outlet to ensure concealment of outlet by fountain.
- b. Anchor bottom of fountain to wall.
- c. Install 3/8 inch IPS union connection and Chicago No. 441 stop to building supply line.
- d. Install 1-1/4 inch IPS slip cast brass 'P' trap. Install trap so it is concealed.

2. Accessible Drinking Fountains:

- a. Spout outlets of wheelchair accessible drinking fountains shall be 36 inches maximum above floor.
- b. Spout outlets of drinking fountains for standing persons shall be 38 inches and 43 inches maximum above floor.

3.2 CLEANING

- A. Polish chrome finish at completion of Project.

END OF SECTION

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DIVISION 23: HEATING, VENTILATING, AND AIR-CONDITIONING

23 0500 COMMON WORK RESULTS FOR HVAC

- 23 0501 COMMON HVAC REQUIREMENTS
- 23 0529 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
- 23 0548 VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT
- 23 0553 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
- 23 0713 DUCT INSULATION

23 1000 FACILITY FUEL SYSTEMS

- 23 1123 FACILITY NATURAL GAS PIPING

23 2000 HVAC PIPING

- 23 2600 CONDENSATE DRAIN PIPING

23 3000 HVAC AIR DISTRIBUTION

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

23 4000 HVAC AIR CLEANING DEVICES

- 23 4100 AIR FILTERS

23 7000 CENTRAL HVAC EQUIPMENT

- 23 7413 PACKAGED, OUTDOOR, CENTRAL-STATION AIR HANDLING UNITS

END OF TABLE OF CONTENTS

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**SECTION 23 0501
COMMON HVAC REQUIREMENTS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Common requirements and procedures for HVAC systems.
 - 2. Responsibility for proper operation of electric 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 03 3111: 'Cast-In-Place Structural Concrete' for exterior concrete pads and bases for mechanical equipment.
 - 2. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
 - 3. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
 - 4. Section 07 9213: 'Elastometric Joint Sealant' for quality of sealants used at building exterior.
 - 5. Section 07 9219: 'Acoustical Joint Sealants' for quality of acoustical sealants.
 - 6. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.
 - 7. Division 26: Raceway and conduit, unless specified otherwise, line voltage wiring, outlets, and disconnect switches.
 - 8. 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. 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. 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.
 - 2. Identification:
 - a. Motor and equipment name plates as well as applicable UL / ULC shall be in place when Project is turned over to Owner.
- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
 - 1. Company:
 - a. Company specializing in performing work of this section.
 - 1) Minimum five (5) years experience in HVAC installations.
 - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
 - b. Upon request, submit documentation.
 - 2. Installer:
 - a. Licensed for area of Project.
 - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
 - c. Upon request, submit documentation.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Accept valves on site in shipping containers with labeling in place.
- B. Storage And Handling Requirements:
 - 1. In addition to requirements specified in Division 01:
 - a. Stored material shall be readily accessible for inspection by Architect until installed.
 - b. Store items subject to moisture damage, such as controls, in dry, heated spaces.
 - c. Provide temporary protective coating on cast iron and steel valves.
 - d. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
 - 2. Protect bearings during installation. Thoroughly grease steel shafts to prevent corrosion.

1.5 WARRANTY

- A. Manufacturer Warranty:
 - 1. Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record 'start-up' date of each piece of equipment on certificate.
- B. Special Warranty:
 - 1. Guarantee HVAC systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
 - 2. If HVAC sub-contractor with offices located more than 150 miles from Project site is used, provide service / warranty work agreement for warranty period with local HVAC sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

PART 2 - PRODUCTS**2.1 COMPONENTS**

- A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.
- B. Pipe And Pipe Fittings:
 - 1. Use domestic made pipe and pipe fittings on Project.
 - 2. Weld-O-Let and Screw-O-Let fittings are acceptable.
- C. Sleeves:
 - 1. In Framing: Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 ga galvanized sheet metal two sizes larger than bare pipe or insulation on insulated pipe.
 - 2. In Concrete And Masonry: Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.
- D. Valves:
 - 1. Valves of same type shall be of same manufacturer.

PART 3 - EXECUTION**3.1 INSTALLERS**

- A. Acceptable Installers. See Section 01 4301:
 - 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.

3.3 PREPARATION

- A. Changes Due To Equipment Selection:
 - 1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings, if requested by Architect, showing proposed installations.
 - 2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
 - 3. Provide any additional motors, valves, controllers, fittings, and other additional equipment required for proper operation of system resulting from selection of equipment.
 - 4. Be responsible for the proper location of roughing-in and connections provided under other Divisions.

3.4 INSTALLATION

- A. Interface With Other Work:
 - 1. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and see they are properly installed.
 - 2. Electrical: Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
 - 3. Testing And Balancing:
 - a. Put HVAC systems into full operation and continue their operation during each working day of testing and balancing.
 - b. Make changes in pulleys, belts, fan speeds, and dampers or add dampers as required for correct balance as recommended by Testing And Balancing Agency and at no additional cost to Owner.
- B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.
- C. Locating Equipment:
 - 1. Arrange pipes, ducts, and equipment to permit ready access to valves, cocks, unions, traps, filters, starters, motors, control components, and to clear openings of doors and access panels.
 - 2. Adjust locations of pipes, ducts, switches, panels, and equipment to accommodate work to interferences anticipated and encountered.
 - 3. Install HVAC work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
 - 4. Determine exact route and location of each pipe and duct before fabrication.
 - a. Right-Of-Way:
 - 1) Lines that pitch shall have right-of-way over those that do not pitch. For example, steam, steam condensate, and drains shall normally have right-of-way.
 - 2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
 - b. Offsets, Transitions, and Changes in Direction:
 - 1) Make offsets, transitions, and changes in direction in pipes and ducts as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
 - 2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.
- D. Piping:
 - 1. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus.
 - a. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper erection of systems of piping in every respect.
 - b. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings.
 - 1) Arrange so as to facilitate removal of tube bundles.
 - 2) Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.
 - a) Make connections of dissimilar metals with di-electric unions.
 - b) Install valves and unions ahead of traps and strainers. Provide unions on both sides of traps.
 - 3) Do not use reducing bushings, street elbows, bull head tees, close nipples, or running couplings.
 - 4) Install piping systems so they may be easily drained. Provide drain valves at low points and manual air vents at high points in hot water heating and cooling water piping.
 - 5) Install piping to insure noiseless circulation.
 - 6) Place valves and specialties to permit easy operation and access. Valves shall be regulated, packed, and glands adjusted at completion of work before final acceptance.
 - c. Do not install piping in shear walls.
 - 2. Properly make adequate provisions for expansion, contraction, slope, and anchorage.
 - a. Cut piping accurately for fabrication to measurements established at site. Remove burr and cutting slag from pipes.

- b. Work piping into place without springing or forcing. Make piping connections to pumps and other equipment without strain at piping connection. Remove bolts in flanged connections or disconnect piping to demonstrate that piping has been so connected, if requested.
- c. Make changes in direction with proper fittings.
- d. Expansion of Thermoplastic Pipe:
 - 1) Provide for expansion in every 30 feet of straight run.
 - 2) Provide 12 inch offset below roof line in each vent line penetrating roof.
- 3. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete floors on grade. Seal sleeves with specified sealants.
 - a. Sleeves through floors shall extend 1/4 inch above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
 - b. Sleeves through floors and foundation walls shall be watertight.
- 4. Provide spring clamp plates (escutcheons) where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.
- 5. Remove dirt, grease, and other foreign matter from each length of piping before installation.
 - a. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
 - b. Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.
 - c. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.
- E. Penetration Firestops: Install Penetration Firestop System appropriate for penetration at HVAC system penetrations through walls, ceilings, roofs, and top plates of walls.
- F. Sealants:
 - 1. Seal openings through building exterior caused by penetrations of elements of HVAC systems.
 - 2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.

3.5 REPAIR / RESTORATION

- A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
 - 1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
 - 2. Surface finishes shall exactly match existing finishes of same materials.

3.6 FIELD QUALITY CONTROL

- A. Field Tests:
 - 1. Perform tests on HVAC piping systems. Furnish devices required for testing purposes.
- B. Non-Conforming Work:
 - 1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
 - 2. Repeat tests on new material, if requested.

3.7 SYSTEM START-UP

- A. Off-Season Start-up:
 - 1. If Substantial Completion inspection occurs during heating season, schedule spring start-up of cooling systems. If inspection occurs during cooling season, schedule autumn start-up for heating systems.
 - 2. Notify Owner seven days minimum before scheduled start-up.
 - 3. Time will be allowed to completely service, test, check, and off-season start systems. During allowed time, train Owner's representatives in operation and maintenance of system.
 - 4. At end of off-season start-up, furnish Owner with letter confirming that above work has been satisfactorily completed.
- B. Preparations that are to be completed before start up and operation include, but are not limited to, following:
 - 1. Dry out electric motors and other equipment to develop and properly maintain constant insulation resistance.
 - 2. Make adjustments to insure that:
 - a. Equipment alignments and clearances are adjusted to allowable tolerances.
 - b. Nuts and bolts and other types of anchors and fasteners are properly and securely fastened.

- c. Packed, gasketed, and other types of joints are properly made up and are tight and free from leakage.
- d. Miscellaneous alignments, tightenings, and 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 Facility Manager in operation and maintenance of mechanical systems utilizing Operation And Maintenance Manual when so doing.
 - a. Minimum Instruction Periods:
 - 1) HVAC: Eight (8) hours.
 - 2) Temperature Control: Six (6) hours.
 - b. Conduct instruction periods after Substantial Completion inspection when systems are properly working and before final payment is made. None of these instructional periods shall overlap another.

3.10 PROTECTION

- A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.
- B. Do not operate pieces of equipment used for moving supply air without proper air filters installed properly in system.
- C. After start-up, continue necessary lubrication and be responsible for damage to bearings while equipment is being operated up to Substantial Completion.

END OF SECTION

SECTION 23 0529
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Common hanger and support requirements and procedures for HVAC systems.
- B. Related Requirements:
 - 1. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
 - 2. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
 - 3. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.
- C. Products Installed But Not Furnished Under This Section:
 - 1. Stencils and band colors of gas piping used in HVAC equipment.
- D. Related Requirements:
 - 1. Section 09 9124: 'Interior Painted Metal' for providing field painting of identification of piping used with HVAC equipment.
 - 2. Section 23 0553: 'Identification For HVAC Piping And Equipment' for HVAC piping and equipment identification signage requirements.
 - 3. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Section 09 9124 to coordinate with Section 23 0529 for location of identification of HVAC piping and equipment to be field painted and Section 23 0553 for painting requirements of HVAC piping and equipment.
 - 2. Section 23 0529 to coordinate with Section 23 0553 for stencil and band color locations and identification requirements of HVAC piping and equipment for field application.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's catalog data for each manufactured item.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Class Two Quality Standard Approved Manufacturers. See Section 01 6200:
 - a. Anvil International, Portsmouth, NH www.anvilintl.com.
 - b. Cooper B-Line, Highland, IL www.cooperbline.com.
 - c. Erico International, Solon, OH www.erico.com.
 - d. Thomas & Betts, Memphis, TN www.superstrut.com.
 - e. Unistrut, Wayne, MI www.unistrut.com.
- B. Performance:
 - 1. Design Criteria:
 - a. Support rods for single pipe shall be in accordance with following table:

Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller
1/2 inch	2-1/2 to 3-1/2 inches
5/8 inch	4 to 5 inches
3/4 inch	6 inches
7/8 inch	8 to 12 inches

- b. Support rods for multiple pipes supported on steel angle trapeze hangers shall be in accordance with following table:

Rods		Number of Pipes per Hanger for Each Pipe Size						
No.	Diameter	2 Inch	2.5 Inch	3 Inch	4 Inch	5 Inch	6 Inch	8 Inch
2	3/8 Inch	Two	0	0	0	0	0	0
2	1/2 Inch	Three	Three	Two	0	0	0	0
2	5/8 Inch	Six	Four	Three	Two	0	0	0
2	5/8 Inch	Nine	Seven	Five	Three	Two	Two	0
2	5/8 Inch	Twelve	Nine	Seven	Five	Three	Two	Two

- 1) Size trapeze angles so bending stress is less than 10,000 psi.

C. Materials:

1. Hangers, Rods, Channels, Attachments, And Inserts:
 - a. Galvanized and UL approved for service intended.
 - b. Support horizontal piping from clevis hangers or on roller assemblies with channel supports, except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.
 - c. Class Two Quality Standards:
 - 1) Support insulated pipes with clevis hanger equal to Anvil Fig 260 or roller assembly equal to Anvil Fig 171 with an insulation protection shield equal to Anvil Fig 167. Gauge and length of shield shall be in accordance with Anvil design data.
 - 2) Except uninsulated copper pipes, support uninsulated pipes from clevis hanger equal to Anvil Fig 260. Support uninsulated copper pipe from hanger equal to Anvil Fig CT-65 copper plated hangers and otherwise fully suitable for use with copper tubing.
 - d. Riser Clamps For Vertical Piping:
 - 1) Class Two Quality Standard: Anvil Figure 261.
 - e. Steel Deck Bracket:
 - 1) 6 inch length minimum.
 - 2) Class One Quality Standard: Unistrut P1000 with clamp nut.
 - 3) Acceptable Manufacturers: Hilti, Thomas & Betts.
 - 4) Equal as approved by Architect before installation. See Section 01 6200.
 - f. Furnace / Fan Coil Support Channel:
 - 1) Class One Quality Standard: Unistrut P1000.
 - 2) Acceptable Manufacturers: Hilti, Thomas & Betts.
 - 3) Equal as approved by Architect before installation. See Section 01 6200.
 - g. Swivel Attachment:
 - 1) Class One Quality Standard: Unistrut EM3127.
 - 2) Acceptable Manufacturers: Hilti, Thomas & Betts.
 - 3) Equal as approved by Architect before installation. See Section 01 6200.

EXECUTION**2.2 INSTALLATION****A. Piping:**

1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.
 - a. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using support channels and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
 - b. Supports For Horizontal Piping:
 - 1) Support metal piping at 96 inches mm on center maximum for pipe 1-1/4 inches or larger and 72 inches on center maximum for pipe 1-1/8 inch or less.
 - 2) Support thermoplastic pipe at 48 inches on center maximum.
 - 3) Provide support at each elbow. Install additional support as required.
 - c. Supports for Vertical Piping:
 - 1) Place riser clamps at each floor or ceiling level.
 - 2) Securely support clamps by structural members, which in turn are supported directly from building structure.
 - 3) Provide clamps as necessary to brace pipe to wall.
 - d. Attach support channel to structural steel roof supporting structure. Spacing and support as described above.
 - e. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.
 - f. Expansion of Thermoplastic Pipe:
 - 1) Provide for expansion in every 30 feet of straight run.
 - 2) Provide 12 inch offset below roof line in each vent line penetrating roof.

END OF SECTION

SECTION 23 0548**VIBRATION AND SEISMIC CONTROL FOR HVAC PIPING AND EQUIPMENT****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Quality of and requirements for anchorage and seismic restraint systems and vibration isolation systems for HVAC piping and equipment.
- B. Related Requirements:
 - 1. Section 03 3053: 'Miscellaneous Exterior Cast-In-Place Concrete'.
 - 2. Furnishing and installing of seismic restraint and vibration isolation systems is by installer of equipment requiring such systems. Manufacturers of equipment specified for seismic restraint shall provide product data needed for calculation of seismic restraint needs. This information shall include, but not be limited to, equipment dimensions, dimensioned anchor points, operating weight, and center of gravity dimension.

1.2 REFERENCES

- A. Association Publications:
 - 1. Federal Emergency Management Agency (FEMA) / Vibration Isolation and Seismic Control Manufacturers Association (VISCMA) / American Society of Civil Engineers (ASCE):
 - a. FEMA 412, 'Installing Seismic Restraints For Mechanical Equipment' (December 2002).
 - 2. Vibration Isolation and Seismic Control Manufacturers Association (VISCMA):
 - a. VISCMA 101-12, 'Seismic Restraint Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.
 - b. VISCMA 102-12, 'Vibration Isolation Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.
- B. Definitions:
 - 1. Vibration Isolation: Vibration reduction in which an isolation system is placed between the source of unwanted vibration and an item which needs to be shielded from the vibration.
- C. Reference Standards:
 - 1. American Nat'l Stds Institute / Sheet Metal And Air Conditioning Contractors' National Assoc.:
 - a. ANSI/SMACNA 001-2008, 'Seismic Restraint Manual: For Mech. Systems' (3rd Ed).
 - 2. American Society of Civil Engineers / Structural Engineering Institute:
 - a. ASCE/SEI 7-10, 'Minimum Design Loads for Buildings and Other Structures'.
 - 1) Chapter 13, 'Seismic Design Requirements For Nonstructural Components'.
 - 3. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
 - a. 2011 ASHRAE Handbook - HVAC Applications.
 - 1) Chapter 48, 'Noise and Vibration Control'.
 - 2) Chapter 55, 'Seismic- and Wind-Resistant Design'.
 - 4. ASTM International:
 - a. ASTM A615/A615M-12, 'Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement'.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Restraint system and anchorage method to be used for each piece of equipment.
 - b. Seismic restraints and calculations for all flexible mounted equipment.
 - c. Vibration isolators and flexible couplings.
 - d. Clearly outlined procedures for installing and adjusting isolators, seismic bracing anchors, and snubbers.
 - 2. Shop Drawings:
 - a. Show size, hanger length, and location of seismic restraints for piping and ductwork.
 - b. Show details for each isolator and seismic brace with snubbers proposed for specified equipment.
 - c. Show details for proposed structural steel frames and rails and for anchors to be used in conjunction with isolation of equipment.
 - d. Show locations of piping and ductwork restraints on installation and fabrication floor plans (not bid set of documents of floor plans), noting size and type of restraint to be used.
 - e. Show details of supports, hangers, anchorage, and bracing for isolated equipment as designed or proposed by professional engineer employed by Restraint Manufacturer and qualified with seismic experience in bracing for mechanical equipment. Shop drawings submitted for seismic bracing and anchors shall bear engineer's signed professional seal.

- f. Include anchor bolt calculations, signed and stamped by registered engineer, showing adequacy of bolt sizing and type.
 - 1) Calculations shall include anchor embedment, minimum edge distance and minimum center distance.
 - 2) Design lateral forces shall be distributed in proportion to mass distribution of equipment.
 - 3) Furnish calculations for anchors on restraint devices, cable, isolators, and on rigidly mounted equipment.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. System design and installation shall meet seismic requirements as defined in ASCE/SEI 7-10, 'Minimum Design Loads for Buildings and Other Structures' and applicable state and local codes in accordance with minimum restraint capability of 1.0 g.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

- A. Manufacturers:
 - 1. Type One Acceptable Manufacturers:
 - a. Amber / Booth Company, Houston, TX www.amberbooth.com.
 - b. Mason Industries Inc, Hauppauge, NY www.mason-ind.com.
 - c. Vibration Mountings and Control Inc, Bloomington, NJ (201) 838-1780.
 - d. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Performance:
 - 1. Design Criteria:
 - a. Isolation And Seismic Equipment:
 - 1) Piping: Restrain piping in accordance with ANSI/SMACNA 001 Seismic Restraint Manual, Chapter 4, Figures 4.11 to 4.19.
 - 2) Equipment with Fixed Anchor or Support:
 - a) Restraint designed according to ASCE/SEI 7-10, Chapter 13, 'Seismic Design Requirements For Nonstructural Components'.
 - b) Horizontal force factor for elements of structures:
 - (1) In addition, vertical force restraint requirement shall be computed at 1/2 value of horizontal forces.
 - (2) Restrain equipment not anchored directly to floors by cable system designed and furnished by Restraint Manufacturer.
 - 3) Ductwork: Restrain ductwork in accordance with ANSI/SMACNA 001 Seismic Restraint Manual, Chapter 4, Figures 4.2 to 4.10 as appropriate.
 - b. Vibration Isolation Requirements:
 - 1) Isolate equipment from structure by means of resilient vibration and noise isolators.
 - 2) Unless otherwise noted, isolate HVAC equipment one horsepower and over from structure by means of resilient vibration and noise isolators in accordance with ASHRAE 'Handbook - HVAC Applications', Chapter 48, Table 1, 'Design Guidelines for HVAC-Related Background Sound in Rooms'.
 - 3) Design and install isolation equipment, hangers, connections, and other isolating devices to prevent transmission of vibration to structure from equipment and associated piping and ductwork.
 - 4) For floor-mounted equipment, use recommendations with ASHRAE 'Handbook - HVAC Applications', Chapter 48, Table 1, 'Design Guidelines for HVAC-Related Background Sound in Rooms'.
 - 5) For roofs and floors constructed with open web joints, thin long span slabs, wooden construction and unusual light weight construction, evaluate equipment weighing more than 300 pounds to determine additional deflection of structure caused by equipment weight. Isolator deflection shall be 15 times additional deflection or deflection shown in ASHRAE 'Handbook - HVAC Applications', Chapter 48, Table 1, 'Design Guidelines for HVAC-Related Background Sound in Rooms', whichever is greater.
 - 6) Under-Equipment Spring Isolators:
 - a) Equal to Mason SSLFH earthquake motion restrained spring mounts with freestanding stable steel springs, leveling bolts, corrosion resistant finish, motion limiting design, uplift restraining bolts, 1/4 inch ribbed neoprene noise stop pad.
 - b) Isolators shall accept force in any direction up to 1.0 g without failure, and shall limit movement to 3/4 inch in any direction.
 - c) Springs shall have 50 percent overload capacity.

- d) Size as required to achieve specified static deflection.
- e) Outer diameter of spring proper shall not be less than 0.8 of spring height when in loaded position.
- 7) Overhead Support Spring And Rubber Hangers:
 - a) Combination spring and neoprene hangers.
 - b) Hanger bracket shall have 500 percent overload capability and shall allow up to 15 degree hanger rod misalignment without short-circuiting.
 - c) Springs shall have 50 percent overload capacity.
 - d) Provide seismic bracing as required.
- 8) Isolate piping and ductwork in mechanical equipment room and piping and ductwork three supports away or 50 feet from other mechanical equipment, whichever is greater, from structure by means of vibration and noise isolators.
 - a) Isolate suspended piping with combination spring and fiberglass hangers in supporting rods.
 - b) Support floor-mounted piping directly on spring mounts.
- 9) Isolate vertical pipe risers from structure using vibration and noise isolating expansion hangers having minimum rated deflection of four times anticipated pipe movement. Enclose in housing for fail-safe equipment.
- 10) Incorporate flexible connectors in piping adjacent to reciprocating equipment.
- 11) Incorporate flexible connections in ductwork adjacent to air-moving units.
- 12) Elastomeric Isolator: Neoprene or high quality synthetic rubber with anti-ozone and anti-oxidant additives.
- 13) Nuts, Bolts, And Washers: Electroplated zinc.
- 14) Isolators Exposed To Weather: Cadmium plated and neoprene coated springs.
- c. Seismic Requirements:
 - 1) Mechanical equipment, piping, and ductwork shall be braced, snubbed, or supported to withstand seismic disturbances and remain operational.
 - 2) Seismic restraint equipment and resilient isolation devices shall be designed and furnished by single Manufacturer:
- C. Finishes:
 - 1. Clean and paint steel components. Thoroughly clean structural steel bases of welding slag and prime with zinc-chromate or metal etching primer. Etch and paint hot dipped galvanized steel components.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Isolation Equipment:
 - 1. Mount vibration isolated equipment on rigid steel frames or concrete bases unless Equipment Manufacturer certifies direct attachment capability.
 - 2. Install snubbers with factory set clearances.
 - 3. Piping:
 - a. Protect isolated and non-isolated piping 2-1/2 inches inside diameter and larger in all planes by restraints to accommodate thermal movement as well as restrain seismic motions.
 - b. Locations shall be as scheduled and include, but not be limited to:
 - 1) At drops to equipment and at flexible connections.
 - 2) At 45 degree or greater changes in direction of pipe.
 - 3) At horizontal runs of pipe 30 feet maximum on center spacing.
 - 4) Gas piping shall have additional restraints as scheduled.
 - 4. Ductwork:
 - a. Protect isolated and non-isolated rectangular ductwork 4 feet square in cross-sectional area and larger in all planes by restraints to accommodate thermal movement as well as restrain seismic motion.
 - b. Locations shall be determined by Seismic Restraint Manufacturer and include, but not be limited to:
 - 1) Horizontal runs of ductwork 30 feet maximum on center spacing.
 - 2) 45 degree or greater changes in direction of ductwork.
 - 3) Each end of duct runs and drops of equipment.
 - 4) Each flexible connection.
- B. Vibration Isolation: Install piping and ductwork to prevent transmission of noise and vibration into structure.

END OF SECTION

SECTION 23 0553 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Products Furnished But not Installed Under This Section:
 - 1. Identification of HVAC piping and equipment as described in Contract Documents including:
 - a. Paint identification for gas piping used in HVAC equipment.
 - b. Stencils and band colors for gas piping used in HVAC equipment.
- B. Related Requirements:
 - 1. Section 09 9124: 'Interior Painted Metal' for providing field painting of identification of piping used with HVAC equipment.
 - 2. Section 22 0529: 'Hangers And Supports For Plumbing' for field installation of pipe stencils and band colors for identification for piping used with HVAC equipment.

PART 2 - PRODUCTS

2.1 SYSTEMS

- A. Description:
 - 1. Abbreviations for Pipe Stencils and Equipment Identification and Band Colors for Pipe Identification:
 - a. Apply stenciled symbols and color banding as follows. Extend color band 2 inches minimum beyond each side of stenciled symbols.

Pipe Type	Band Color	Symbol
Relief Vent	Carlsbad Canyon	RV

 - b. Apply continuous painting as follows:
 - 1) Mechanical Mezzanine And Exposed on Roof:

Pipe Type	Pipe Color
Gas	Yellow
- B. Materials:
 - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
 - 2. Description:
 - a. Ferrous Metal:
 - 1) New Surfaces: Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system.
 - 3. Performance Requirements:
 - a. New Surfaces: MPI Premium Grade finish requirements.
 - b. Maintain specified colors, shades, and contrasts.
 - 4. Paint (one coat):
 - a. Primer:
 - 1) Ferrous Metal:
 - a) MPI 107, 'Primer, Rust-Inhibitive, Water Based'.
 - (1) Color: white.
 - b. Finish Coat (two coats):
 - 1) Ferrous Metal:
 - a) MPI 153, 'Light Industrial Coating, Interior, Water Based, Semi-Gloss.
 - 5. Labels:
 - a. Equipment Identification:
 - 1) Black formica, with white reveal when engraved.
 - 2) Lettering to be 3/16 inch high minimum.
 - 6. Tags:
 - a. Regardless of size, each valve shall have brass tag 1-1/2 inches by 3 inch minimum in size and 0.051 inch thick.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Labels:
 - 1. Identify following items with specified labels fastened to equipment with screws (unless noted otherwise):
 - a. Thermostats in mechanical spaces (attach label to wall directly above or below thermostats).
 - b. Thermostats and control panels in mechanical spaces.
 - c. Rooftop Units.

- d. Unit Heaters.
 - e. Accessible exhaust fans.
- 2. Engrave following data from Equipment Schedules on Drawings onto labels:
 - a. Equipment mark.
 - b. Area served.
 - c. Thermostat zone number, when different from equipment mark.
 - d. Panel and breaker from which unit is powered.
- B. 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.
- C. Painting:
 - 1. New Surfaces:
 - a. Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.
 - 2. Leave equipment in like-new appearance.
 - 3. Only painted legends, directional arrows, and color bands are acceptable.
 - 4. Locate identifying legends, directional arrows, and color bands at following points on exposed piping of each piping system:
 - a. Adjacent to each item of equipment.
 - b. At point of entry and exit where piping goes through wall.
 - c. On each riser and junction.
 - d. Every 25 feet on long continuous lines.
 - e. Stenciled symbols shall be one inch high and black.

END OF SECTION

**SECTION 23 0713
DUCT INSULATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install thermal wrap duct insulation as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 23 3114: 'Low-Pressure Metal Ducts'.
 - 2. Section 23 3300: 'Acoustic Duct Accessories' for duct liner.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Manufacturer Contact List:
 - 1. Certainteed St Gobain, Valley Forge, PA www.certainteed.com.
 - 2. Johns-Manville, Denver, CO www.jm.com.
 - 3. Knauf Fiber Glass, Shelbyville, IN www.knauffiberglass.com or Toronto, ON (416) 593-4322.
 - 4. Manson Insulation Inc, Brossard, QB www.isolationmanson.com.
 - 5. Owens-Corning, Toledo, OH.

2.2 MATERIALS

- A. Thermal Wrap Duct Insulation:
 - 1. 1-1/2 inch or 3 inch thick fiberglass with factory-laminated, reinforced aluminum foil scrim kraft facing and density of 0.75 lb / per cu ft.
 - 2. Thermal Conductivity: 0.27 BTU in/HR SF deg F at 75 deg F 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 thick on rectangular outside air ducts and combustion air ducts.
 - 2) 1-1/2 inches thick on all round ducts.
 - b. Outside Building Insulation Envelope:
 - 1) 3 inch thick on round supply and return air ducts.
 - 2) 1-1/2 inch thick on rectangular, acoustically lined, supply and return air ducts.
 - 2. Wrap insulation tightly on ductwork with circumferential joints butted and longitudinal joints overlapped minimum 2 inches.
 - a. Do not compress insulation except in areas of structural interference. Minimum thickness at corners shall be one inch thick.
 - b. Remove insulation from lap before stapling.
 - c. Staple seams at approximately 16 inches 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 1123
FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Perform excavation and backfill required for work of this Section.
 - 2. Furnish and install gas piping and fittings within building and from building to meter including connection to meter as described in Contract Documents.
- B. Related Requirements:
 - 1. Sections Under 09 9000 Heading: 'Paints And Coatings' for painting of exterior piping.
 - 2. Section 23 0501: 'Common HVAC Requirements'.
 - 3. Section 23 0553: 'Identification for HVAC Piping and Equipment'.
 - 4. Section 31 2316: 'Excavation' for procedure and quality of excavation.
 - 5. Section 31 2323: 'Fill' for procedure and quality of backfill and compaction.
 - 6. Section 33 5100: 'Natural-Gas Distribution' for gas line from meter to main.

1.2 REFERENCES

- A. Reference Standards:
 - 1. American National Standards Institute / CSA Group:
 - a. ANSI LC 4-2012 (2017) / CSA 6.32-2012 (R2016), 'Press-Connect Metallic Fittings for Use in Fuel Gas Distribution Systems'.
 - 2. ASTM International:
 - a. ASTM A53/A53M-12, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
 - b. ASTM A234/A234M-16, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service'.
 - c. ASTM D2513-16a, 'Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings'.
 - 3. CSA Group (Canadian Standards Association):
 - a. CSA B149.1-15, 'Natural Gas and Propane Installation Code'.
 - 4. International Code Council (ICC):
 - a. ICC IFGC-2015: 'International Fuel Gas Code'.

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Conform to requirements of requirements of IFGC International Fuel Gas Code.
 - 2. Viega MegaPressG fittings:
 - a. Conform to requirements of Canadian Standards Association CSA B149.1 and to requirements of IFGC International Fuel Gas Code.
- B. Qualifications:
 - 1. Welders:
 - a. Welders shall be certified and bear evidence of certification thirty (30) days before commencing work on project.
 - b. If there is doubt as to proficiency of welder, Owner's Representative may require welder to take another test. This shall be done at no cost to Owner. Certification shall be by Pittsburgh Testing Laboratories or other approved authority.
 - 2. Pipe Installers:
 - a. Polyethylene pipe installers shall be properly trained and certified in procedure for joining polyethylene pipe.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
 - 1. Do not store polyethylene pipe so it is exposed to sunlight.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. BrassCraft, Novi, MI www.brasscraft.com.
 - b. Cimberio Valve Co Inc, Malvern, PA www.cimberio.com.
 - c. ConBraCo Industries, Inc, Matthews, NC www.conbraco.com or ConBraCo / Honeywell Ltd, Scarborough, ON (416) 293-8111.
 - d. Dormont Manufacturing Company, Export, PA www.dormont.com.
 - e. Jomar International, Madison Heights, MI www.jomar.com.

- f. California Valves (formally KOSO) by Pacific Seismic Products Inc, Lancaster, CA, Distributed by Strand Earthquake Consultants www.strandearthquake.net.
 - g. Viega LLC, Broomfield, CO www.viega.com.
 - h. Watts Regulator Co, North Andover, MA www.wattsreg.com (888) 208-8927.
- B. Materials:
 - 1. Above-Ground Pipe:
 - a. Black carbon steel, butt welded, Schedule 40 pipe meeting requirements of A53/A53M.
 - 2. Above-Ground Pipe Fittings:
 - a. Welded forged steel fittings meeting requirements of ASTM A234/A234M.
 - b. Standard weight malleable iron screwed.
 - c. Viega MegaPressG fittings.
 - 3. Below-Ground Pipe And Fittings: Polyethylene pipe and fittings meeting requirements of ASTM D2513 with No. 14 coated copper trace wire.
 - 4. Valves:
 - a. 125 psibronze body ball valve, UL listed.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) CIM 102.1 by Cimbrio Valve.
 - 2) Apollo Series 80-100 by ConBraCo.
 - 3) Model T-204 by Jomar International.
 - 4) Model B-6000-UL by Watts Regulator.
 - 5. Cocks:
 - a. Gauge Cocks: Conbraco Series 50-56 bronze gauge cock.
 - 6. Flexible Connector:
 - a. Type 304 stainless steel corrugated tube coated for corrosion protection.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Dormont Supr-Safe.
 - 2) BrassCraft Procoat.
 - 3) Size to be determined by total cu ft per hour gas flow requirement of building and following conditions: 0.1 inchwater column maximum allowable pressure-drop through valve with available pressure of 4 oz .
 - 4) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - a) California Seismic Gas Shutoff Valve (formally KOSO):
 - (1) Horizontal installation: Model 314F or 315F.
 - (2) Vertical installation with bottom inlet: Model VB314F or VB315F.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Steel pipe installed through air plenums, in walls:
 - 1. Pipes 2-1/2 inches and larger shall have welded fittings and joints.
 - 2. Other steel pipe may have screwed or welded fittings.
 - 3. Viega MegaPressG:
 - a. Install MegaPressG fittings according to Manufacture's recommendations and with Manufacture's recommended tools.
- B. Lay underground pipe in accordance with Manufacturer's recommendations and local gas utility company regulations and specifications.
 - 1. Provide 24 inch minimum steel pipe between vertical rise of riser and end of polyethylene line if anode-less riser is not used. Use plastic-to-steel transition or compression fitting between end of polyethylene line and steel meter riser. Provide cathodic protection for steel riser or use anode-less riser.
 - 2. Place tracer wire along side of polyethylene pipe from meter to point where pipe rises inside building.
 - 3. Place 4 inches of sand around gas line buried underground.
 - 4. Do not install gas piping under building floor slabs-on-grade.
- C. After gas meter, valves, seismic valve and etc, gas piping should rise inside outside wall and not be visible to public.
- D. On lines serving gas-fired equipment, install gas cocks adjacent to equipment outside of equipment cabinet and easily accessible.
- E. Install 6 inch long minimum dirt leg, with pipe cap, on vertical gas drop serving each gas-fired equipment unit.
- F. Use fittings for changes of direction in pipe and for branch runouts.
- G. Visible gas piping inside building shall be painted yellow and labeled.

3.2 FIELD QUALITY CONTROL

A. Field tests:

1. Subject all portions of gas piping system, in sections or in entirety, to air pressure of 75 psig and prove airtight for four (4) hours.
2. Disconnect equipment not suitable for 75 psig pressure from piping system during test period.

END OF SECTION

**SECTION 23 2600
CONDENSATE DRAIN PIPING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Coordinate installation of condensate drain piping with Section 22 0501 as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 22 0501: 'Common Plumbing Requirements'.
 - 2. Section 23 0501: 'Common HVAC Requirements'.

1.2 REFERENCES

- A. Reference Standards:
 - 1. ASTM International:

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Materials:
 - 1. Condensate Drains:
 - a. Schedule 40 PVC for condensate drains from furnace combustion chambers and furnace cooling coils.
 - 2. Solvent Cement and Adhesive Primer:
 - a. Use PVC solvent cement that has a VOC content of 510 g/L or less if required by local AHJ if required.
 - b. Use adhesive primer that has a VOC content of 550 g/L or less if required by local AHJ if required.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Condensate Drains:
 - 1. Support piping and protect from damage.
 - 2. Do not combine PVC condensate drain piping from furnace combustion chamber with copper condensate drain piping from cooling coil.

END OF SECTION

**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).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference: Schedule conference immediately before installation of ductwork.

1.4 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: Specification data on sealer and gauze proposed for sealing ductwork.
 - 2. Samples: Sealer and gauze proposed for sealing ductwork.
- B. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Installation manuals providing detailed instructions on assembly, joint sealing, and system pressure testing for leaks.

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 by 18 ga galvanized steel straps or steel rods as shown on Drawings, and spaced not more than 96 inches apart. Do not use wire hangers.
 - b. Attach threaded rod to steel joist with Anvil Steel washer plate Fig. 60. Double nut connection.

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. Secure vertical ducts passing through floors by extending bracing angles to rest firmly on floors without loose blocking or shimming. Support vertical ducts, which do not pass through floors, by using bands bolted to walls, columns, etc. Size, spacing, and method of attachment to vertical ducts shall be same as specified for hanger bands on horizontal ducts.

3.2 CLEANING

- A. Clean interior of duct systems before final completion.

END OF SECTION

SECTION 23 3114
LOW-PRESSURE METAL DUCTS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install above-grade low-pressure steel ducts and related items as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
 - 1. Duct smoke detectors.
- C. Related Requirements:
 - 1. Section 01 4546: 'Duct Testing, Adjusting, And Balancing' for duct test, balance, and adjust air duct systems services provided by Owner.
 - 2. Section 23 0713: 'Duct Insulation' for thermal Insulation for ducts, plenum chambers, and casings.
 - 3. Section 23 3001: 'Common Duct Requirements'.
 - 4. Section 23 0933: 'Electric And Electronic Control System For HVAC':
 - a. Temperature control damper actuators and actuator linkages.
 - b. Furnishing of duct smoke detectors.

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 or subjected to sustained temperatures exceeding 110 deg F 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 or subjected to sustained temperatures exceeding 110 deg F 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.
 - 2) DP 1010, DP 1030 or DP 1015 by Design Polymerics, Fountain Valley, CA
www.designpoly.com.
 - 3) PROseal, FIBERseal, EVERseal, or EZ-seal by Ductmate Industries, Inc., Charleroi, PA
www.ductmate.com.
 - 4) SAS by Duro Dyne, Bay Shore, NY.
 - 5) Iron Grip 601 by Hardcast Inc, Wylie, TX www.hardcast.com.
 - 6) MTS100 or MTS 200 by Hercules Mighty Tough, Denver CO,
www.herculesindustries.com.
 - 7) 15-325 by Miracle / Kingco, Div ITW TACC, Rockland, MA www.taccint.com.
 - 8) 44-39 by Mon-Eco Industries Inc, East Brunswick, NJ www.mon-ecoindustries.com.
 - 9) Airseal Zero by Polymer Adhesive Sealant Systems Inc, Weatherford, TX
www.polymeradhesives.com.
 - 10) Airseal #22 Water Base Duct Sealer by Polymer Adhesive Sealant Systems Inc,
Weatherford, TX www.polymeradhesives.com.
 3. Duct Sealer For Exterior Ducts:
 - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Two Part II Sealing System including RTA-50 liquid adhesive and DT-5300 for 3 inch
and DT 5400 for 4 inch tape by Hardcast Inc, Wylie, TX www.carlislehvac.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 minimum for ducts up to and including 14 inches in diameter.
 - b) 26 ga minimum for ducts over 14 inches and up to and including 26 inches 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.
- G. Where ducts are shown connecting to concrete or masonry openings and along edges of plenums at
floors and walls, provide continuous 2 by 2 by 1/4 inches galvanized angle iron.
 1. Bolt angle iron to structure and make airtight by applying sealant between angle and structure.
 2. Bolt or weld sheet metal at these locations to angle and caulk airtight.
 3. Apply two coats of aluminum paint to angles after installation.

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 3300
AIR DUCT ACCESSORIES

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install duct accessories in specified ductwork as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 23 0933: 'Electric And Electronic Control System For HVAC' for temperature control damper actuators and actuator linkages.
 - 2. Section 23 3001: 'Common Duct Requirements'.

1.2 REFERENCES

- A. Reference Standards:
 - 1. ASTM International:
 - a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
 - b. ASTM C1071-12, 'Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)'.
 - c. ASTM C1338-14, 'Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings'.

PART 2 - PRODUCTS**2.1 ACCESSORIES**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. AGM Industries, Brockton, MA www.agmind.com.
 - b. Air Balance Inc, Holland, OH www.airbalance.com.
 - c. Air Filters Inc, Baltimore, MD www.afinc.com.
 - d. Air-Rite Manufacturing, Bountiful, UT (801) 295-2529.
 - e. American Warming & Ventilating, Holland, OH www.american-warming.com.
 - f. Arrow United Industries, Wyalusing, PA www.arrowunited.com.
 - g. Cain Manufacturing Company Inc, Pelham, AL www.cainmfg.com.
 - h. C & S Air Products, Fort Worth, TX www.csairproducts.com.
 - i. CertainTeed Corp, Valley Forge, PA www.certainteed.com.
 - j. Cesco Products, Florence, KY www.cescoproducts.com.
 - k. Daniel Manufacturing, Ogden, UT (801) 622-5924.
 - l. Design Polymerics, Fountain Valley, CA www.designpoly.com.
 - m. Ductmate Industries Inc, East Charleroi, PA www.ductmate.com.
 - n. Duro Dyne, Bay Shore, NY www.durodyne.com.
 - o. Dyn Air Inc. Lachine, QB www.dynair.ca
 - p. Elgen Manufacturing Company, Inc. East Rutherford, NJ www.elgenmfg.com
 - q. Flexmaster USA Inc, Houston, TX www.flexmasterusa.com.
 - r. Greenheck Corp, Schofield, WI www.greenheck.com.
 - s. Gripnail Corp, East Providence, RI www.gripnail.com.
 - t. Hardcast Inc, Wylie, TX www.hardcast.com.
 - u. Hercules Industries, Denver, CO, www.herculesindustries.com.
 - v. Honeywell Inc, Minneapolis, MN www.honeywell.com.
 - w. Industrial Acoustics Co, Bronx, NY www.industrialacoustics.com.
 - x. Johns-Manville, Denver, CO www.jm.com.
 - y. Kees Inc, Elkhart Lake, WI www.kees.com.
 - z. Knauf Fiber Glass, Shelbyville, IN www.knauffiberglass.com.
 - aa. Manson Insulation Inc, Brossard, QB www.isolationmanson.com.
 - bb. Metco Inc, Salt Lake City, UT (801) 467-1572 www.metcospiral.com.
 - cc. Miracle / Kingco, Rockland, MA www.taccint.com.
 - dd. Mon-Eco Industries Inc, East Brunswick, NJ www.mon-ecoindustries.com.
 - ee. Nailor Industries Inc, Houston, TX www.nailor.com.
 - ff. Owens Corning, Toledo, OH www.owenscorning.com.
 - gg. Polymer Adhesive Sealant Systems Inc, Irving, TX www.polymeradhesives.com.
 - hh. Pottorff Company, Fort Worth, TX www.pottorff.com.
 - ii. Ruskin Manufacturing, Kansas City, MO www.ruskin.com.
 - jj. Sheet Metal Connectors Inc, Minneapolis, MN www.smconnectors.com.
 - kk. Tamco, Stittsville, ON www.tamco.ca.

- ll. Techno Adhesive, Cincinnati, OH www.technoadhesives.com.
- mm. Titus, Richardson, TX (972) 699-1030. www.titus-hvac.com
- nn. McGill AirSeal, Columbus, OH www.mcgillairseal.com.
- oo. United Enertech Corp, Chattanooga, TN www.unitedenertech.com.
- pp. Utemp Inc, Salt Lake City, UT (801) 978-9265.
- qq. Ventfabrics Inc, Chicago, IL www.ventfabrics.com.
- rr. Ward Industries, Grand Rapids MI www.wardind.com.
- ss. Young Regulator Co, Cleveland, OH www.youngregulator.com.

B. Materials:

1. Acoustical Liner System:

a. Duct Liner:

- 1) One inch thick, 1-1/2 lb density fiberglass conforming to requirements of ASTM C1071. Liner will not support microbial growth when tested in accordance with ASTM C1338.
- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) ToughGard by CertainTeed.
 - b) Duct Liner E-M by Knauf Fiber Glass.
 - c) Akousti-Liner by Manson Insulation.
 - d) Quiet R by Owens Corning.
 - e) Linacoustic RC by Johns-Manville.

b. Adhesive:

- 1) Category Four Approved Water-Based Products. See Section 01 6200 for definitions of Categories:
 - a) Cain: Hydrotak.
 - b) Design Polymerics: DP2501 or DP2502 (CMCL-2501).
 - c) Duro Dyne: WSA.
 - d) Elgen: A-410-WB.
 - e) Hardcast: Coil-Tack.
 - f) Hercules: Mighty Tough Adhesives MTA500 or MTA600.
 - g) Miracle / Kingco: PF-101.
 - h) Mon-Eco: 22-67 or 22-76.
 - i) Polymer Adhesive: Glasstack #35.
 - j) Techno Adhesive: 133.
 - k) McGill AirSeal: Uni-tack.
- 2) Category Four Approved Solvent-Based (non-flammable) Products. See Section 01 6200 for definitions of Categories:
 - a) Cain: Safetak.
 - b) Duro Dyne: FPG.
 - c) Hardcast: Glas-Grip 648-NFSE.
 - d) Miracle / Kingco: PF-91.
 - e) Mon-Eco: 22-24.
 - f) Polymer Adhesive: Q-Tack.
 - g) Techno Adhesive: 'Non-Flam' 106.
- 3) Category Four Approved Solvent-Based (flammable) Products. See Section 01 6200 for definitions of Categories:
 - a) Cain: HV200.
 - b) Duro Dyne: MPG.
 - c) Hardcast: Glas-Grip 636-SE.
 - d) Miracle / Kingco: PF-96.
 - e) Mon-Eco: 22-22.
 - f) Polymer Adhesive: R-Tack.
 - g) Techno Adhesive: 'Flammable' 106.

c. Fasteners:

- 1) Adhesively secured fasteners not allowed.
- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) AGM Industries: 'DynaPoint' Series RP-9 pin.
 - b) Cain.
 - c) Duro Dyne.
 - d) Gripnail: May be used if each nail is installed by 'Grip Nail Air Hammer' or by 'Automatic Fastener Equipment' in accordance with Manufacturer's recommendations.

2. Flexible Equipment Connections:
 - a. 30 oz closely woven UL approved glass fabric, double coated with neoprene.
 - b. Fire retardant, waterproof, air-tight, resistant to acids and grease, and withstand constant temperatures of 200 deg F.
 - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Cain: N-100.
 - 2) Duro Dyne: MFN.
 - 3) Dyn Air: CPN with G-90 galvanized off-set seam.
 - 4) Elgen: ZLN / SDN.
 - 5) Ventfabrics: Ventglas.
 - 6) Ductmate: ProFlex.
3. Duct Access Doors:
 - a. General:
 - 1) Factory built insulated access door with hinges and sash locks, as necessary. Construction shall be galvanized sheet metal, 24 ga minimum.
 - 2) Fire and smoke damper access doors shall have minimum clear opening of 12 inches square or larger as shown on Drawings.
 - b. Rectangular Ducts:
 - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Air Balance: Fire/Seal FSA 100.
 - b) Air-Rite: Model HAD-2.
 - c) Cesco: HDD.
 - d) Elgen: TAB Type / Hinge and Cam.
 - e) Flexmaster: Spin Door.
 - f) Kees: ADH-D.
 - g) Nailor: 08SH.
 - h) Pottorff: 60-HAD.
 - i) Ruskin: ADH-24.
 - j) United Enertech: L-95.
 - c. Round Ducts:
 - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Ductmate: 'Sandwich' Access Door.
 - b) Elgen: Sandwich Access Door.
 - c) Kees: ADL-R.
 - d) Nailor: 0809.
 - e) Pottorff: RAD.
 - f) Ruskin: ADR.
 - g) Ward: DSA.
4. Dampers And Damper Accessories:
 - a. Locking Quadrant Damper Regulators:
 - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Duro Dyne: KS-385.
 - b) Dyn Air: QPS-385.
 - c) Elgen: EQR-4.
 - d) Ventfabrics: Ventline 555.
 - e) Young: No. 1.
 - b. Concealed Ceiling Damper Regulators:
 - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Cain.
 - b) Duro Dyne.
 - c) Elgen.
 - d) Metco Inc.
 - e) Ventfabrics: 666 Ventlok.
 - f) Young: 301.
 - c. Volume Dampers:
 - 1) Rectangular Duct:
 - a) Factory-manufactured 16 ga galvanized steel, single blade and opposed blade type with 3/8 inch axles and end bearings. Blade width 8 inches maximum. Blades shall have 1/8 inch clearance all around.
 - b) Damper shall operate within acoustical duct liner.

- c) Provide channel spacer equal to thickness of duct liner.
 - d) Dampers above removable ceiling and in Mechanical Rooms shall have locking quadrant on bottom or side of duct. Otherwise, furnish with concealed ceiling damper regulator and cover plate.
 - e) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Air-Rite: Model CD-2.
 - (2) American Warming: VC-2-AA.
 - (3) Arrow: OBDAF-207.
 - (4) C & S: AC40.
 - (5) Cesco: AGO.
 - (6) Daniel: CD-OB.
 - (7) Greenheck: VCD-20.
 - (8) Nailor: 1810 or 1820.
 - (9) Pottorff: CD-42.
 - (10) Ruskin: MD-35.
 - (11) United Enertech: MD-115.
 - (12) Utemp: CD-OB.
- 2) Round Duct:
- a) Factory-manufactured 20 ga galvanized steel, single blade with 3/8 inch axles and end bearings.
 - b) For use in outside air ducts.
 - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Air Balance: Model AC-22.
 - (2) Air-Rite: Model CD-8.
 - (3) American Warming: V-22.
 - (4) Arrow: Type-70.
 - (5) C & S: AC21R.
 - (6) Cesco: MGG.
 - (7) Nailor: 1890.
 - (8) Pottorff: CD-21R.
 - (9) Ruskin: MDRS-25.
 - (10) United Enertech: RD.
- d. Motorized Outside Air Dampers:
- 1) General:
 - a) Low leakage type. AMCA certified.
 - b) Make provision for damper actuators and actuator linkages to be mounted external of air flow.
 - 2) Rectangular Ducts:
 - a) Damper Blades:
 - (1) Steel or aluminum airfoil type with mechanically locked blade seals, 8 inch blade width maximum measured perpendicular to axis of damper.
 - (2) Jamb seals shall be flexible metal compression type.
 - (3) Opposed or single blade type.
 - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Air Balance: AC 526.
 - (2) American Warming: AC526.
 - (3) Arrow: AFD-20.
 - (4) C & S: AC50.
 - (5) Cesco: AGO3.
 - (6) Nailor: 2020.
 - (7) Pottorff: CD-52.
 - (8) Ruskin: CD-60.
 - (9) Tamco: Series 1000.
 - (10) United Enertech: CD-150 or CD-160.
 - 3) Round Ducts:
 - a) Damper Blades:
 - (1) Steel with mechanically locked blade seals.

- (2) Blade seals shall be neoprene or polyethylene.
 - (3) Single blade type.
 - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Air Balance: AC 25.
 - (2) American Warming: VC25.
 - (3) Arrow: Type 70 or 75.
 - (4) C & S: AC25R.
 - (5) Cesco: AGG.
 - (6) Nailor: 1090.
 - (7) Pottorff: CD-25R.
 - (8) Ruskin: CD25.
 - (9) Tamco: Square-to-Round Series 1000.
 - (10) United Enertech: RI.
 - e. Backdraft Dampers:
 - 1) Backdraft blades shall be nonmetallic neoprene coated fiberglass type.
 - 2) Stop shall be galvanized steel screen or expanded metal, 1/2 inch mesh.
 - 3) Frame shall be galvanized steel or extruded aluminum alloy.
 - 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Air-Rite: Model BDD-3.
 - b) American Warming: BD-15.
 - c) C & S: BD30.
 - d) Pottorff: BD-51.
 - e) Ruskin: NMS2.
 - f) Utemp: BFEA.
- 5. Duct Silencers:
 - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Air Filters: AIRSAN.
 - 2) Industrial Acoustic.
 - 3) Titus.
 - 4) McGill AirSeal.
- 6. Air Turns:
 - a. Single thickness vanes. Double thickness vanes not acceptable.
 - b. 4-1/2 inch wide vane rail. Junior vane rail not acceptable.
- 7. Branch Tap for Flexible Ductwork:
 - a. Factory-manufactured rectangular-to-round 45 degree leading tap fabricated of 24 ga zinc-coated lock-forming quality steel sheets meeting requirements of ASTM A653, with G-90 coating.
 - b. One inch wide mounting flange with die formed corner clips, pre-punched mounting holes, and adhesive coated gasket.
 - c. Manual Volume Damper:
 - 1) Single blade, 22 ga minimum
 - 2) 3/8 inch minimum square rod with brass damper bearings at each end.
 - 3) Heavy-duty locking quadrant on 1-1/2 inch high stand-off mounting bracket attached to side of round duct.
 - d. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) ST-1HD by Air-Rite:
 - a) Nylon damper bearings approved for Air-Rite.
 - 2) STO by Flexmaster.
 - 3) HET by Sheet Metal Connectors.
- C. Fabrication:
 - 1. Duct Liner:
 - a. Install mat finish surface on airstream side. Secure insulation to cleaned sheet metal duct with continuous 100 percent coat of adhesive and with 3/4 inch long mechanical fasteners 12 inches on center maximum unless detailed otherwise on Drawings. Pin all duct liner.
 - b. Accurately cut liner and thoroughly coat ends with adhesive. Butt joints tightly. Top and bottom sections of insulation shall overlap sides. If liner is all one piece, folded corners shall be tight against metal. Ends shall butt tightly together.
 - c. Coat longitudinal and transverse edges of liner with adhesive.

2. Air Turns:
 - a. Permanently install vanes arranged to permit air to make abrupt turn without appreciable turbulence, in 90 degree elbows of above ground supply and return ductwork.
 - b. Quiet and free from vibration when system is in operation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Duct Liner:
 1. Furnish and install acoustic lining in following types of rectangular ducts unless noted otherwise on Contract Documents:
 - a. Supply air.
 - b. Return air.
 - c. Elbows, fittings, and diffuser drops greater than 12 inches in length.
 2. Do not install acoustic lining in round ducts.
- B. Flexible Connections: Install flexible inlet and outlet duct connections to each furnace.
- C. Access Doors In Ducts:
 1. Install at each manual outside air damper and at each motorized damper. Locate doors within 6 inches of installed dampers.
 2. Install within 6 inches of fire dampers and in Mechanical Room if possible. Install on side of duct that allows easiest access to damper.
- D. Dampers And Damper Accessories:
 1. Install concealed ceiling damper regulators.
 - a. Paint cover plates to match ceiling tile.
 - b. Do not install damper regulators for dampers located directly above removable ceilings or in Mechanical Rooms.
 2. Provide each take-off with an adjustable volume damper to balance that branch.
 - a. Anchor dampers securely to duct.
 - b. Install dampers in main ducts within insulation.
 - c. Dampers in branch ducts shall fit against sheet metal walls, bottom and top of duct, and be securely fastened. Cut duct liner to allow damper to fit against sheet metal.
 - d. Where concealed ceiling damper regulators are installed, provide cover plate.
 3. Install motorized dampers.

END OF SECTION

**SECTION 23 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.
 - b. Flexmaster USA Inc, Houston, TX www.flexmasterusa.com.
 - c. Thermaflex by Flexible Technologies, Abbeville, SC.
- 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, 3/4 lb per cu ft 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 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 maximum lengths.
- B. Make duct connections by coating exterior of duct collar for 3 inches 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.
 - 2. Broan-Nu Tone LLC, Harford, WI www.broan.com.
 - 3. Carnes Co., Verona, MI www.carnes.com.
 - 4. Loren Cook Co., Springfield, MO www.lorencook.com.
 - 5. Soler & Palau (S&P USA Ventilation Systems, LLC), Jacksonville FL 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.
 - 2. Krueger Air System Components, Richardson, TX www.krueger-hvac.com.
 - 3. Metal*Aire by Metal Industries Inc, Clearwater, FL www.metalaire.com.
 - 4. Nailor Industries Inc, Houston, TX or Weston, ON www.nailor.com.
 - 5. Price Industries Inc, Suwanee, GA www.price-hvac.com or E H Price Ltd, Winnipeg, MB (204) 669-4220.
 - 6. Titus, Richardson, TX www.titus-hvac.com.
 - 7. Tuttle & Bailey, Richardson, TX www.tuttleandbailey.com.

2.2 MANUFACTURED UNITS

- A. Lay-In Ceiling Diffusers:
 - 1. Finish: White baked enamel.
 - 2. Removable inner core assembly.
 - 3. Performance Standard: Titus TMSA Border Type 3.
 - 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Carnes.
 - b. Krueger.
 - c. Metal*Aire.
 - d. Nailor.
 - e. Price.
 - f. Titus.
 - g. Tuttle & Bailey.
- B. Hard Ceiling Diffusers:
 - 1. Finish: White baked enamel.
 - 2. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Carnes: SKSA.
 - b. Krueger: SH Frame F21.
 - c. Metal*Aire: 5500S-2.
 - d. Price: SMD.
 - e. Titus: TDC Border Type 6.
 - f. Tuttle & Bailey: MS.
- C. Ceiling Return And Transfer Grilles:
 - 1. Finish: White baked enamel.
 - 2. 1/2 inch by 1/2 inch aluminum cove.
 - 3. Class One Quality Standard: Titus 50F-3.
 - a. Carnes.
 - b. Kreuger.
 - c. Metal*Aire.
 - d. Nailor.
 - e. Price.
 - f. Titus.
 - g. Tuttle & Bailey.
- D. Side Wall Return Grilles:
 - 1. Finish: Off-white baked enamel.
 - 2. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Krueger: 5810.

- b. Metal*Aire: 41C.
 - c. Nailor: 51RCD.
 - d. Price: RCG.
 - e. Titus: 1700.
 - f. Tuttle & Bailey: AVF.
- E. Low Side Wall Return Grilles:
 - 1. Finish: White baked enamel.
 - 2. Performance Standard: Titus 355.
 - 3. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Carnes.
 - b. Krueger.
 - c. Metal*Aire.
 - d. Nailor.
 - e. Price.
 - f. Titus.
 - g. 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

**SECTION 23 4100
AIR FILTERS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install filters used in mechanical equipment.
- B. Related Requirements:
 - 1. Section 23 3001: 'Common Duct Requirements'.
 - 2. Section 23 7413: 'Packaged, Outdoor, Central-Station Air Handling Units'.

1.2 REFERENCES

- A. Reference Standard:
 - 1. American National Standards Institute (ANSI) / American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
 - a. ANSI/ASHRAE 52.2-2012, 'Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size'.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Air Handling Unit Filters:
 - 1. 2 inch thick, ANSI/ASHRAE MERV 8, disposable type pre-formed pleated design, having at least 4.5 sq ft of filtering media per sq ft of face area.
 - 2. Media shall be reinforced non-woven cotton fabric, treated with adhesive similar to 'Vyclad B' and continuously laminated to supporting steel wire grid conforming to configuration of pleats.
 - 3. Media pack shall be sealed in a chipboard frame or beverage board.
 - 4. Filters shall have rated average efficiency of 25 to 30 percent on ANSI/ASHRAE 52.2 Test Standard and be capable of operating with variable face velocities up to 500 FPM without impairing efficiency.
 - 5. Initial resistance shall not exceed 0.30 inch wg at 500 FPM or 0.14 inch wg at 300 FPM. Filter shall be listed Class 2 by UL.
 - 6. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a. DP-40 by Airguard Industries Inc, Louisville, KY www.airguard.com.
 - b. Aerostar Series 400 by Filtration Group, Santa Rosa, CA www.filtrationgroup.com.
 - c. PrePleat 40 by Flanders, St Petersburg, FL www.flanderscorp.com.
 - d. Type 30/30 by Camfil Farr Co, Riverdale, NJ www.camfilfarr.com or Farr Inc, Laval, QB (519) 629-3030.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Provide ample access for filter removal.

3.2 FIELD QUALITY CONTROL

- A. Inspection: At date of Substantial Completion, air filters shall be new, clean, and approved by Owner's representative.

END OF SECTION

SECTION 23 7413**PACKAGED, OUTDOOR, CENTRAL-STATION AIR HANDLING UNITS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install packaged air conditioning units as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 23 0501: 'Common HVAC Requirements'.

1.2 REFERENCES

- A. Definitions:
 - 1. Compressor: Pump that increases vapor (refrigerant or air) pressure from one level to a higher level of pressure.
 - 2. Condenser: Device used to condense refrigerant in a cooling system.
 - 3. Condenser Coils: In an air conditioner, the coil dissipates heat from the refrigerant, changing the refrigerant from vapor to liquid.
 - 4. Condensing Unit: Outside section of an air conditioning system which pumps vaporized refrigerant from the evaporator, compresses it, liquefies it in the condenser and returns it to the evaporator coil. The outdoor portion of a split system air conditioner contains the compressor and outdoor coil.
 - 5. EER (Energy Efficiency Rating): Rating that lists how many BTU's per hour are used for each watt of power it draws.
 - 6. Refrigerant: Absorbs heat by a change of state (evaporation) from liquid to a gas, and releases heat by a change of state (condenses) from gas back to a liquid.
 - 7. SEER (Seasonal Energy Efficiency Ratio): Measure of cooling efficiency for air conditioners and heat pumps. A ratio of total cooling in comparison to electrical energy input in watts per hour. Higher the seer, the more energy efficient the unit. Since 2006, the minimum SEER required by the Department of Energy is 13.00 and 15.00+ SEER is considered high efficiency.

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Air-Cooled Condensing Unit Section shall be UL approved and rated according to ARI Standards.
 - 2. Air delivery of units certified in accordance with standard test code for centrifugal fans adopted by AMCA.
 - 3. Furnace sections shall be AGA approved.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Ship units with lifting angles and fully charged with refrigerant R-22.

1.5 WARRANTY

- A. Manufacturer Warranty:
 - 1. 5 year warranty on compressors.

PART 2 - PRODUCTS**2.1 PERFORMANCE**

- A. Capacities:
 - 1. SEER rating, as defined by ARI, shall be not less than 13.0 for units 5 tons and smaller.
 - 2. EER rating, as defined by ARI, shall be not less than 9.5 for units larger than 5 tons.

2.2 MANUFACTURED UNITS

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Carrier Corporation:
 - 1) Carrier National: Bradley Brunner (270) 282-1241 Bradley.M.Brunner@Carrier.utc.com.
 - 2) Carrier Utah: Rich Carpenter (Contractors HVAC Supply) (801) 410-6077 e-mail rcarpent@mtncom.net.
 - b. Lennox Industries:
 - 1) For pricing and information call: Lennox National Account at 1-800-367-6285.
 - 2) Lennox National Contact: Cody Jackson (801) 736-8904 Cody.Jackson@LennoxInd.com.
 - c. Honeywell Minneapolis, MN www.honeywell.com.
 - d. Trane Company:
 - 1) Salt Lake Trane, attention: Jason Bradford (801) 486-0500 www.Jason.Bradford@trane.com.

B. Air Conditioning Units:

1. Units shall be completely factory assembled and tested. Units shall include following components and features:
 - a. Condenser coils.
 - b. Condenser fans and motors.
 - c. Interconnected wiring.
 - d. Pre-wired control panel.
 - e. Filter section.
 - f. Factory installed 100 percent modulating economizer cycle including motorized dampers and controls with modulating power exhaust for unit of 3 tons and larger.
 - g. Factory installed 100 percent modulating economizer cycle including motorized dampers and controls with barometric exhaust for unit of 2.5 tons and smaller.
 - h. Corrosion-resistant all-weather cabinet.
2. Air-Cooled Condensing Unit Section:
 - a. Strainer-dryer.
 - b. Time delay or cycle protection to prevent short cycling.
 - c. Condenser Coil: 1/2 inch outside diameter copper tube with aluminum fins. Include condenser coil hail guard assembly.
 - d. Compressors:
 - 1) Equip with crankcase heater.
 - 2) Fully hermetic scroll type internally protected. Independent circuits for units 7-1/2 tons and larger.
 - 3) On units 3 tons and larger, mount on factory rubber-shock, internal spring vibration isolators.
 - e. Condenser Fan: Axial flow type propeller fan.
 - f. Refrigerant Coils: Constructed of copper tubes with mechanically bonded aluminum plate fins.
 - g. Refrigerant lines shall have:
 - 1) Flexible connections.
 - 2) Suction and liquid line service valves.
 - 3) Charging valves.
 - 4) Receiver valve.
3. Furnace Section:
 - a. Units Smaller Than 3 Tons:
 - 1) Aluminized or chromized heat exchanger.
 - 2) Induced-draft motor with solid-state sensor for adequate airflow.
 - b. Units 3 Tons And Larger:
 - 1) Tubular section type of 20 ga steel minimum with 1.2 mil nominal aluminum-silicone alloy coating.
 - 2) Factory-installed induced draft blower.
 - c. Gas shut-off valve.
 - d. High limit switches.
 - e. Fan switch safety pilot and control transformer.
 - f. Automatic electric ignition.
4. Fan Section:
 - a. Indoor Blower (evaporator fan):
 - 1) Steel with corrosion-resistant finish and dynamically balanced. Bearings shall be sealed, permanently lubricated, ball bearing type.
 - 2) Belt driven, double inlet, forward curved centrifugal type with adjustable pitch motor pulley.
 - b. Condenser fan shall be direct-driven propeller type and discharge upward. Condenser fan shall have blades riveted to corrosion-resistant steel spiders and be dynamically balanced. Condenser motor shall be totally enclosed.
 - c. Constructed and tested in accordance with AMCA requirements.
 - d. Furnish with flexible connections with weather protection on supply and return air take-offs.
 - e. Evaporator-fan cabinet interior shall be insulated with 1/2 inch thick minimum fiber glass insulation coated on air side. Use Aluminum foil-faced insulation in heating compartment.
5. Controls:
 - a. Low ambient and dual pressure.
 - b. Pre-wired.

- c. Low voltage control circuit with fuse protection on 24 V transformer side.
- d. Solid state compressor protection for following factory-supplied safeties:
 - 1) Compressor over-temperature, over-current.
 - 2) Loss of charge / low-pressure switch.
 - 3) Freeze protection thermostat, evaporator coil.
 - 4) High-pressure switch.
- e. Following minimum protection for heating section:
 - 1) High temperature limit switch.
 - 2) Flame rollout switch.
 - 3) Induced draft motor speed sensor on units 2-1/2 tons and smaller.
 - 4) Flame proving controls on units 3 tons and larger.
- 6. Safety Controls:
 - a. Factory Supplied Duct Smoke Detectors mounted in Supply Air Section of Roof top Cabinet:
 - 1) Description:
 - a) Intelligent low-flow photoelectric duct smoke detector with flashscan. Photo electric smoke detector mounted in systems with airflow greater than 2000 CFM.
 - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Model FSD-751 RP by Notifier by Honeywell.
- 7. Cabinets:
 - a. 3 Ton And Larger Units: Galvanized and weatherproof, with baked enamel finish on externally exposed surfaces and primed interior panel surfaces. Evaporator fan, compressor, and filter panels shall be hinged.
 - b. All Other Units: Galvanized, weatherproof, and coated inside and outside with corrosion-resistant paint.
- 8. Type Two Acceptable Manufacturers:
 - a. Class One Quality Standard: Lennox LGH:
 - 1) Carrier.
 - 2) Lennox.
 - 3) Trane.
 - 4) Equal as approved by Architect before installation. See Section 01 6200.

2.3 ACCESSORIES

- A. Vibration Isolation Curbs:
 - 1. Description:
 - a. Spring type with 2 inch minimum deflection.
 - 2. Design Criteria:
 - a. Comply with Schedule A 'Design Criteria' as noted in Structural Drawings for seismic and wind.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units on vibration isolators.
- B. Set minimum outside air set point.
- C. Install gas regulator so that it is not in direct path of power exhaust discharge.
- D. Do not install electrical disconnect so it interferes with access to power exhaust units.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer Services:
 - 1. Equipment Manufacturer to provide factory start-up service. This includes package roof top unit and economizer with power or barometric exhaust.

END OF SECTION

DIVISION 26: ELECTRICAL

26 0500 COMMON WORK RESULTS FOR ELECTRICAL

- 26 0501 COMMON ELECTRICAL REQUIREMENTS
- 26 0519 LINE-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
- 26 0523 CONTROL-VOLTAGE ELECTRICAL CABLES
- 26 0526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
- 26 0533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
- 26 0613 ELECTRICAL EQUIPMENT MOUNTING HEIGHT SCHEDULE

26 2000 LOW-VOLTAGE ELECTRICAL TRANSMISSION

- 26 2417 CIRCUIT-BREAKER PANELBOARDS
- 26 2726 WIRING DEVICES
- 26 2816 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

26 5000 LIGHTING

- 26 5100 INTERIOR LIGHTING
- 26 5121 INTERIOR LIGHTING: LED DIMMING DRIVERS
- 26 5200 EMERGENCY LIGHTING

END OF TABLE OF CONTENTS

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**SECTION 26 0501
COMMON ELECTRICAL REQUIREMENTS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. General electrical system requirements and procedures.
 - 2. Perform excavating and backfilling work required by work of this Division as described in Contract Documents.
 - 3. Make electrical connections to equipment provided under other Sections.
 - 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: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
 - 2. Section 31 2316: 'Excavation' for criteria for performance of excavating.
 - 3. Section 31 2323: 'Fill' for criteria for performance of backfilling.

1.2 REFERENCES

- A. Reference Standards:
 - 1. National Fire Protection Association / American National Standards Institute:
 - a. NFPA 70, National Electric Code (NEC).
 - 2. National Electrical Manufacturing Association Standards (NEMA):
 - a. NEMA 250, 'Enclosure for Electrical Equipment (1000 Volts Maximum)'.

1.3 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.
 - 6) Section 26 2417: 'Circuit-Breaker Panelboards'.
 - 7) Section 26 2816: 'Enclosed Switches And Circuit Breakers'.
 - 8) Section 26 5100: 'Interior Lighting Fixtures'.
 - 9) Section 26 5200: 'Emergency Lighting' for battery units.
 - b. Do not purchase equipment before approval of product data.
 - 2. Shop Drawings:
 - a. Submit on Panelboards:
 - b. Indicate precise equipment to be used, including all options specified. Indicate wording and format of nameplates where applicable. Submit in three-ring binder with hard cover.
- B. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. Report of site tests, before Substantial Completion.
 - 2. Qualification Statement:
 - a. Electrical 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:
 - 1) Provide operating and maintenance instructions for each item of equipment submitted under Product Data.
 - b. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature.
 - b) Include copy of approved shop drawings.

- c) Provide tritium exit sign tabulations for each exit sign installed on Project including following:
 - (1) Serial number.
 - (2) Expiration number.
 - (3) Installed building location (example – warehouse north rear exit, etc.).

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. NEC and local ordinances and regulations shall govern unless more stringent requirements are specified.
 - 2. Material and equipment provided shall meet standards of NEMA or UL and bear their label wherever standards have been established and label service is available.
- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
 - 1. Electrical Subcontractor:
 - a. Company specializing in performing work of this section.
 - 1) Minimum five (5) years experience in electrical installations.
 - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
 - b. Upon request, submit documentation.
 - 2. Installer:
 - a. Licensed for area of Project.
 - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
 - c. Upon request, submit documentation.

PART 2 - PRODUCTS

2.1 SYSTEMS

- A. Performance:
 - 1. Design Criteria:
 - a. Materials and equipment provided under following Sections shall be by same Manufacturer:
 - 1) Section 26 2417: Panelboards.
 - 2) Section 26 2816: Enclosed Switches And Circuit Breakers.

PART 3 - EXECUTION

3.1 INSTALLERS

- A. Approved Installers. See Section 01 4301:
- B. Acceptable Installers. See Section 01 4301:
 - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.2 EXAMINATION

- A. Verification Of Conditions:
 - 1. Confirm dimensions, ratings, and specifications of equipment to be installed and coordinate these with site dimensions and with other Sections.

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 CLOSEOUT ACTIVITIES

A. Training:

1. Provide competent instructor for three (3) days to train Owner's maintenance personnel in operation and maintenance of electrical equipment and systems. Factory representatives shall assist this instruction as necessary. Schedule instruction period at time of final inspection.

END OF SECTION

SECTION 26 0519**LINE-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Quality of conductors used on Project except as excluded below.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements'.

1.2 REFERENCES

- A. Definitions:
 - 1. Line Voltage: Over 70 Volts.
- B. Reference Standards:
 - 1. National Fire Protection Association:
 - a. NFPA (Fire) 70, 'National Electric Code (NEC)' (2014 Edition or most recent edition adopted by AHJ including all applicable amendments and supplements).

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Line Voltage Conductors:
 - 1. Copper with AWG sizes as shown:
 - a. Minimum size shall be No. 12 except where specified otherwise.
 - b. Conductor size No. 8 and larger shall be stranded.
 - 2. Insulation:
 - a. Standard Conductor Size No. 10 And Smaller: 600V type THWN or XHHW (75 deg F).
 - b. Standard Conductor Size No. 8 And Larger: 600V Type THW, THWN, or XHHW (75 deg F).
 - c. Higher temperature insulation as required by NFPA 70 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. 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.

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 Contract 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 Contract 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 Contract Drawings.
 - d. Where common neutral is run for two or three home run circuits, connect phase conductors to breakers in panel which are attached to separate phase legs:
 - 1) Provide breaker tie so that all circuits that share common neutral are simultaneously disconnected.

- 2) Neutral conductors shall be of same size as phase conductors unless specifically noted otherwise.
4. Pulling Conductors:
 - a. Do not pull conductors into conduit until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
 - b. Do not use heavy mechanical means for pulling conductors.
 - c. Use only listed wire pulling lubricants.

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.
- B. Related Requirements:
 - 1. Section 23 0933: 'Electric And Electronic Control System For HVAC' for cables for Temperature Control System.
 - 2. Section 26 0501: 'Common Electrical Requirements'.
 - 3. Section 26 0924: 'Lighting Control System'.
 - 4. Section 27 1501: 'Communications Horizontal Cabling' for voice and data system cables.
 - 5. Section 27 4117: 'Video Systems' for cables.
 - 6. Section 27 5117: 'Audio Systems' for cables.
 - 7. Section 28 3101: 'Fire Detection And Alarm System' for cables.

1.2 REFERENCES

- A. Definitions:
 - 1. Control Voltage: 70 Volts and under.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Category Four Approved Cable Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Alpha Wire Co, Elizabeth, NJ www.alphawire.com.
 - b. Belden Wire & Cable Co, Richmond, IN www.belden.com.
 - c. Liberty Wire & Cable, Colorado Springs, CO www.libertycable.com.
 - d. West Penn Wire Corp, Washington, PA www.westpenn-cdt.com.
- B. Components:
 - 1. Building Control System Cables.
 - a. CAT 5E, 24 AWG, solid bare copper, four pair, UTP, white cable jacket.
 - b. Sheath Colors:
 - 1) Lighting Control: Yellow.
 - c. Meet requirements of EIA / TIA 568 Standard.
 - 2. Lighting Control Cables and Conductors:
 - a. Provide cable per Lighting Control Panel Manufacturer's recommendations and requirements.
 - b. Lighting Control Cables ran in same raceway as line voltage cables shall have same insulation voltage rating as line voltage conductors.
 - c. Cable Jacket shall be yellow.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. General:
 - 1. Cables shall be continuous and without splices from source to outlet.
 - 2. Run cables in raceway as indicated on Contract Drawings.
 - 3. Run exposed cables parallel to or at right angles to building structure lines.
 - 4. Keep cables 6 inch 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 1/2 inch diameter maximum.
 - 7. Bundle only cables of same systems together.
 - 8. Do not run cables within 10 inches of line voltage conductors/raceways.
 - 9. Extend cables 18 inches from wall or ceiling at all outlet locations. Extend cables to twice vertical length of cabinet at each cabinet location.
 - 10. Pulling cables into conduit:
 - a. Do not pull cables until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
 - b. Do not use heavy mechanical means for pulling cables.
 - c. Use only listed wire pulling lubricants.

11. Prohibited procedures:
 - a. Boring holes for installation of cables in vertical truss members.
 - b. Notching of structural members for installation of cables.
- B. Control Cables:
 1. For cables not installed in raceway, do not run cables within 10 inches of line voltage conductors / raceways. Also, maintain 10 inches minimum between following exposed cable groups:
 - a. Microphone cables.
 - b. CAT-6, sound system control, telephone, video, or ATC cables.
 - c. Loudspeaker cables.

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 REFERENCES

- A. Reference Standards:
 - 1. Institute of Electrical and. Electronics Engineers (IEEE):
 - a. IEEE 837-2014, 'Standard for Qualifying Permanent Connections Used in Substation Grounding'.
 - 2. National Fire Protection Association:
 - a. NFPA (Fire) 70, 'National Electric Code (NEC)' (2014 Edition or most recent edition adopted by AHJ including all applicable amendments and supplements).
 - b. NFPA (Fire) 780, 'Standard for the Installation of Lightning Protection Systems' (2014 Edition or most recent edition adopted by AHJ including all applicable amendments and supplements).
 - 3. Telecommunications Industry Association:
 - a. TIA-942, 'Telecommunications Infrastructure Standard for Data Centers' (Revision A, 2014).
 - 4. Section 27 1501: 'Communications Horizontal Cabling' for cables for Telephone and Data Systems.

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Requirements of Section 27 1501 applies, but is not limited to following:
 - a. Cable assemblies shall be UL / CE Listed and CSA Certified. Cables shall be a distinctive green or green/yellow in color, and all jackets shall be UL, VW-1 flame rated.
 - b. Grounding shall conform to all required Commercial Building Grounding and Bonding Requirements for Telecommunications, Electrical Codes, and Manufacturer's grounding requirements.
 - 2. Systems shall be installed per NFPA 780 and NFPA 70.
 - 3. All Bonds shall comply with most current version of IEEE 837 Standard.
- B. Qualifications: Requirements of Section 01 4301 applies, but is not limited to following:
 - 1. Installers Qualifications:
 - a. Grounding and Bonding:
 - 1) Licensed electrical contractor shall perform installation and termination of main bonding conductor to building service entrance ground.
 - 2) Licensed in State that Work is to be performed.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Type One Acceptable Products:
 - a. 'Cadweld' by Erico International, Solon, OH www.erico.com.
 - b. 'ThermOweld' by Continental Industries, Tulsa, NE www.conind.com.
 - c. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Performance:
 - 1. Design Criteria:
 - a. Size materials as shown on Drawings and in accordance with applicable codes.
 - b. Bonding System Workmanship:
 - 1) The ground/earthing system shall be designed for high reliability and shall meet following criteria:
 - a) Local electrical codes shall be adhered to.
 - b) All grounding/earthing conductors shall be copper.
 - c) Regulatory Agency Sustainability Approvals requirements are required.
- C. Materials:
 - 1. Grounding And Bonding Jumper Conductors: Bare copper or with green insulation.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Grounding conductors and bonding jumper conductors shall be continuous from terminal to terminal without splice. Provide grounding for following.
 - 1. Conduits and other conductor enclosures.
 - 2. Neutral or identified conductor of interior wiring system.
 - 3. Power and lighting panelboards.
 - 4. Non-current-carrying metal parts of fixed equipment such as motors, starter and controller cabinets, instrument cases, and lighting fixtures.
- B. Pull grounding conductors in non-metallic raceways, in flexible steel conduit exceeding 72 inches in length, and in flexible conduit connecting to mechanical equipment.
- C. Provide grounding bushings on all feeder conduit entrances into panelboards and equipment enclosures.
- D. Bond conduit grounding bushings to enclosures with minimum #10 AWG conductor.
- E. Connect equipment grounds to building system ground.
 - 1. Use same size equipment grounding conductors as Phased conductors up through #10 AWG.
 - 2. Use NEC Table 250-95 for others unless noted otherwise in Drawings.
- F. Run separate insulated grounding cable from each equipment cabinet to electrical panel. Do not use intermediate connections or splices. Affix directly to cabinet.
- G. 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.
 - 3. Furnish and install main electrical service raceway as described in Contract Documents and comply with electrical utility company requirements.
 - 4. Furnish and install main telephone service raceway as described in Contract Documents and comply with telephone company requirements.
 - 5. Furnish and install indoor service poles.
- B. Related Requirements:
 - 1. See Section 07 8400: 'Firestopping' for raceways penetrating fire rated walls, ceilings, and barriers'.
 - 2. Section 26 0501: 'Common Electrical Requirements' for general electrical requirements'.
 - 3. Section 27 1501: 'Communications Horizontal Cabling' for raceway for telephone and data systems.
 - 4. Section 27 4117: 'Video Systems' for system wiring.
 - 5. Section 27 5117: 'Audio Systems' for sound system wiring.

1.2 REFERENCES

- A. Reference Standards:
 - 1. National Fire Protection Association:
 - a. NFPA (Fire) 70, 'National Electric Code (NEC)' (2014 Edition or most recent edition adopted by AHJ including all applicable amendments and supplements).
 - 2. Telecommunications Industry Association:
 - a. TIA-569, 'Telecommunications Pathways And Spaces' (Revision D, 2015).
 - 3. Underwriters Laboratories:
 - a. UL 498, 'Attachment Plugs and Receptacles' (15th Edition, 2012).

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Provide Manufacturer's data sheets and descriptive literature on each product to be used, including:
 - 1) Preparation instructions and recommendations.
 - 2) Storage and handling requirements and recommendations.
 - 3) Installation methods.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer Qualifications:
 - a. Firms regularly engaged in manufacturer of raceway and box distribution products and systems of types and sizes required, whose products have been in satisfactory use in similar service for not less than ten (10) years.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Cooper B-Line, Highland, IL www.b-line.com.
 - b. Hubbell Incorporated, Milford, CT www.hubbell-wiring.com.
 - c. Square D, Palatine, IL www.squared.com.
 - d. Thomas & Betts, Memphis, TN www.tnb.com.
 - e. Walker Systems Inc, Williamstown, WV (800) 240-2601.
 - f. Wiremold Co, West Hartford, CT www.wiremold.com.
- B. Materials:
 - 1. Raceway And Conduit:
 - a. Sizes:
 - 1) 3/4 inch for exterior use, unless indicated otherwise.
 - 2) 1/2 inch 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), Flexible Steel Conduit, and Electrical Non-Metallic Tubing (ENT):
 - 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 only for exterior underground use unless indicated otherwise on drawings for connection to in-slab equipment or boxes.
 - 4) Listed, Liquid-Tight Flexible Metal Conduit:
 - a) Use in outdoor final connections to mechanical equipment, length not to exceed 36 inches.
 - 5) Pre-wired 3/8 Inch Flexible Fixture Whips: Allowed only for connection to recessed lighting fixtures, lengths not to exceed 72 inches.
 - 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: Sealtite 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. 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 square.
 - 2) Boxes for remote temperature sensor devices shall be recessed single device.
 - 3) Boxes for thermostats shall be 4 inches square with raised single device cover.
4. Power Floor Boxes:
- a. Type Two Acceptable Products:
 - 1) 887 cast iron box 885 brass duplex cover plate for carpet by Walker Systems.
 - 2) B-2537 cast iron box with SF3925 brass duplex cover plate for carpet by Hubbell.
 - 3) Equal as approved by Architect before installation. See Section 01 6200.

5. Multi-Service Floor Box:
 - a. Type Two Acceptable Products:
 - 1) RFB4 steel floor box with telephone/data and audio/video brackets and FPCTCAL flush flanged cover assembly for carpet by Wiremold.
 - 2) Equal as approved by Architect before use. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
 1. Confirm dimensions, ratings, and specifications of materials to be installed and coordinate these with site dimensions and with other Sections.
 2. Examine conditions under which raceways and boxes are to be installed. Do not proceed with installation until substrates have been properly prepared and deviations from Manufacturer's recommended tolerances are corrected.
 3. Notify Architect in writing if substrates are not acceptable to install raceways and boxes.
 - a. Commencing installation constitutes acceptance of existing conditions.

3.2 PREPARATION

- A. Prepare substrates using methods recommended by manufacturer for achieving best result for substrate under project conditions.

3.3 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 coolers 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 outlets under his direction.
 3. Coordinate installation of floor boxes in carpeted areas with carpet installer to obtain carpet for box covers.
 4. 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:
- C. Conduit And Raceway:
 1. Conceal conduit and raceways within ceilings and walls, except at Contractor's option, conduit and raceways 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. Seal all raceways penetrating fire rated walls, ceilings and barriers. See Section 07 8400.
 3. Keep raceway runs 6 inches minimum from hot water pipes.
 4. 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 NFPA 70.
 5. 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.
 6. Install insulated bushings on each end of raceway 1-1/4 inches in diameter and larger. Install expansion fittings where raceways cross building expansion joints.
 7. Run two spare conduits from each new panelboard to ceiling access area or other acceptable accessible area and cap for future use.
 8. Bend PVC conduit by hot box bender and, for PVC 2 inches in diameter and larger, expanding plugs. Apply PVC adhesive only by brush.
 9. Installation In Framing:
 - a. 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.
 - b. Holes shall be one inch diameter maximum.

10. Underground Raceway And Conduit:
 - a. Bury underground raceway installed outside building 24 inches deep minimum.
 - b. Bury underground conduit in planting areas 24 inches deep minimum. It is permissible to install conduit 6 inch below concrete sidewalks, however, conduit must be buried 24 inches deep at point of exit from planting areas.
 - c. Install conduit in/or under concrete slab only at locations shown on drawings.
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. Installation of raceway beneath or embedded in concrete, except where explicitly shown on Contract Documents.
 - b. Use of wooden plugs inserted in concrete or masonry units for mounting raceway, supports, boxes, cabinets, or other equipment.
 - c. Installation of raceway that has been crushed or deformed.
 - d. Use of torches for bending PVC.
 - e. Spray applied PVC cement.
 - f. Boring holes in truss members.
 - g. Notching of structural members.
 - h. Supporting raceway from ceiling system support wires.
 - i. Nail drive straps or tie wire for supporting raceway.

D. Telephone / Data Systems:

1. Install raceway from terminal board to each telephone and data outlet as indicated on Contract Drawings.
2. Conduit to stub from each terminal or telephone and data outlet to above accessible ceiling.

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 Contract 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 6 inches from 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.

3.4 REPAIR

- A. Touch-up, repair or replace damaged products before completion of project.

3.5 CLEANING

A. General:

1. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer.

3.6 PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION

SECTION 26 0613
ELECTRICAL EQUIPMENT MOUNTING HEIGHT SCHEDULE

PART 1 - GENERAL: Not Used

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Unless otherwise indicated, mount center of outlets or boxes at following heights above finish floor. Refer special conditions to Architect before rough-in and locate outlet under his direction.
- B. Mounting Heights:
 - 1. HVAC:
 - a. Temperature Control Junction Boxes: As indicated on Drawings.
 - b. Thermostats not mounted in occupied space: As indicated on Drawings.
 - c. Remote Temperature Sensors and thermostats mounted in occupied space:
 - 1) Wall-Mounted 50 inches to top.
 - 2) Column-Mounted As indicated on Drawings.
 - d. Indoor Motor Disconnects: 60 inches.
 - e. Outdoor Motor Disconnects: As indicated on Drawings.
 - f. Motor Controls: 60 inches.
 - 2. Plumbing:
 - a. Electric Water Cooler Outlets: Mount so outlet and cord are hidden by water cooler and outlet is accessible for resetting for GFCI trip.
 - 3. Electrical:
 - a. Distribution Panels: 72 inches to top.
 - b. Receptacles: 18 inches.
 - c. Wall Switches: 42 inches.
 - d. Wall-Mounted Exit Lights: 94 inches.
 - e. Emergency Lighting Units: 60 inches.
 - 4. Communications
 - a. Sound Distribution System Components: As indicated on Drawings.
 - b. Computer and TV: 18 inches.
 - c. Telephones (wall type): 60 inches.
 - d. Telephones (desk type): 18 inches.
 - e. Telephone / Data (desk type): 18 inches.
 - f. Data (desk type): 18 inches.

END OF SECTION

SECTION 26 2417
CIRCUIT-BREAKER PANELBOARDS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install circuit-breaker panelboards as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements'.

PART 2 - PRODUCTS**2.1 EQUIPMENT**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Cutler-Hammer Inc, Pittsburgh, PA www.eatonelectric.com.
 - b. General Electric Industrial Systems, Charlotte, NC www.geindustrial.com.
 - c. Siemens Energy & Automation, Alphrata, GA www.sea.siemens.com.
 - d. Square D Co, Palatine, IL www.us.squared.com.
- B. Performance:
 - 1. Capacities:
 - a. Lighting And Appliance Panelboards:
 - 1) Minimum integrated equipment short circuit rating of 10,000 amperes for 120 / 240 Volts.
- C. Material:
 - 1. Circuit-breaker type.
 - 2. Galvanized steel cabinets
 - 3. Bussing and lugs arranged as required.
 - 4. Multi-pole circuit-breakers shall be common trip.
 - 5. Circuit-breakers shall be molded case thermal magnetic type with inverse time characteristics.
 - 6. Lighting And Appliance Panelboards:
 - a. Plug-on or bolt-on breakers. Multi-pole breakers shall be common trip.
 - b. Factory installed or provided circuit number identification for each breaker and space.
 - c. Cabinets shall be locking type with no exposed latches or screws when door is closed. Key panels alike and provide minimum of three keys.
 - d. Minimum dimensions of 20 inches wide by 5-3/4 inches deep.
 - e. Space designation on Drawings indicates bus hardware and panelboard capacity for future acceptance of one 20 Amp, single-pole circuit-breaker.
 - f. Breakers specified to be shunt trip and shall include shunt trip accessories to remotely trip breaker using separate 120 V power source. Trip coil shall include coil-clearing contact to break coil current when breaker opens.
 - g. Use equipment from same manufacturer as main panelboard.
 - h. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Type PRL1a by Cutler-Hammer.
 - 2) Type AL or AQ by General Electric.
 - 3) Type P1 by Siemens.
 - 4) Type NQOD by Square D.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verification Of Conditions:
 - 1. Examine wall framing and verify framing for proper spacing for installation of panelboard(s).
 - a. Notify Architect of improper spacing in writing.

3.2 INSTALLATION

- A. Label panelboards with 1/16 inch thick laminated plastic composition material with contrasting color core. Engraved letters shall be 1/4 inch high.
- B. Provide typewritten circuit schedules in lighting and distribution panelboards to identify load served by each branch breaker.
- C. Arrange conductors neatly within panelboards.
- D. Secure to structure in accordance with requirements of Project seismic design category.

3.3 PROTECTION

- A. Protect panelboards and interior components from paint, gypsum board compound, dirt, dust, and other foreign matter during construction.

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 01 1100: 'Summary Of Work' for Owner will:
 - a. Furnish and install telephones, telephone / data jacks, and plates.
 - b. Label data ports to identify feed point.
 - 2. Section 26 0501: 'Common Electrical Requirements'.

PART 2 - PRODUCTS**2.1 COMPONENTS**

- A. Manufacturers:
 - 1. Manufacturers List:
 - a. Cooper Wiring Devices, Peachtree City, NY www.cooperwiringdevices.com.
 - b. General Electric Industrial Systems, Charlotte, NC www.geindustrial.com.
 - c. Hubbell Building Automation, Austin, TX www.hubbell-automation.com.
 - d. Hubbell Inc, Milford, CT www.hubbell-wiring.com.
 - e. Hunt Control Systems Inc, Fort Collins, CO www.huntdimming.com.
 - f. Intermatic Inc, Spring Grove, IL www.intermatic.com.
 - g. Leviton Manufacturing Co, Little Neck, NY www.leviton.com.
 - h. Lightolier Controls, Callas, TX www.lolcontrols.com.
 - i. Lutron Electronics Co Inc, Coopersburg, PA www.lutron.com.
 - j. Novitas Inc, Peachtree City, GA www.novitas.com.
 - k. Paragon Electric Co Inc, Carol Stream, IL www.icca.invensys.com/paragon.
 - l. Pass & Seymour, Syracuse, NY www.passandseymour.com.
 - m. Red Dot div of Thomas & Betts, Memphis, TN www.tnb.com.
 - n. Schneider Electric North America, Palatine, IL www.schneider-electric.com (847) 397-2600.
 - o. Sensorswitch, Wallingford, CT www.sensorswitch.com.
 - p. Square D Co, Palatine, IL www.us.squared.com.
 - q. Suttle, Hector, MN www.suttleonline.com.
 - r. Tork Inc, Mount Vernon, NY www.tork.com.
 - s. Watt Stopper Inc, Santa Clara, CA www.wattstopper.com.
 - 2. Product Options:
 - a. Faces shall be nylon where available.
 - b. Devices of single type shall be from same Manufacturer.
- B. Switches:
 - 1. Standard Style:
 - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) 20 AMP, single pole for furnace disconnect:
 - a) Cooper: 2221W.
 - b) Hubbell: HBL1221-WA.
 - c) Pass & Seymour: PS20AC1-W.
 - d) Leviton: 1221-2W
 - 2) Two Pole:
 - a) Cooper: 2222W.
 - b) Hubbell: HBL1222-WA.
 - c) Pass & Seymour: PS20AC2-W.
 - d) Leviton: 1222-2W.
 - 3) Three Way:
 - a) Cooper: 2223W.
 - b) Hubbell: HBL1223-WA.
 - c) Pass & Seymour: PS20AC3-W.
 - d) Leviton: 1223-2W.
 - 2. LED Dimmer Control Switches:
 - a. 0 to 10 VDC control.
 - b. Vertical slide control with faceplate.
 - c. Compatible with specified LED dimming drivers.

- d. Type One Acceptable Manufacturers:
 - 1) Hunt.
 - 2) Leviton.
 - 3) Lightolier.
 - 4) Lithonia.
 - 5) Equals as approved by Architect before bidding. See Section 01 6200.
- C. Receptacles:
 - 1. Standard Style:
 - a. 15 AMP, specification grade, back and side wired, self grounding.
 - b. Verified by UL to meet Fed Spec WC-596F.
 - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Cooper: 5252W.
 - 2) Hubbell: HBL5252WA.
 - 3) Leviton: 5252-W.
 - 4) Pass & Seymour: 5252-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. Plates:
 - 1. Standard Cover Plates:
 - a. Finished Areas:
 - 1) Nylon or high impact resistant thermoplastic.
 - 2) Color shall match wiring device.
 - b. Unfinished Areas: Steel.
 - c. Ganged switches shall have gang plates.
 - d. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - 1) Cooper.
 - 2) Hubbell.
 - 3) Leviton.
 - 4) Pass & Seymour.
 - 2. Weatherproof In-Use Receptacle Covers:
 - a. NEMA 3R rated.
 - b. Cast aluminum.
 - c. Compatible with GFCI receptacles.
 - d. Complete with weather resistant gaskets and stainless steel screws.
 - e. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Hubbell: WP26M, horizontal; WP26MH, vertical.
 - 2) Intermatic: WP1010HMC, horizontal; WP1010MC, vertical.
 - 3) Red Dot: CKMG, horizontal; CKMGV, vertical.
- E. Occupancy Sensors:
 - 1. Ceiling, dual technology type.
 - a. Complete with sensor and relay / transformer.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Cooper Controls:
 - a) Sensor: OAC-DT-0501.
 - b) Relay / Transformer: SP20-MV.
 - 2) Hubbell:
 - a) Sensor: OMNIDT500.
 - b) Relay / Transformer: UVPP.
 - 3) Leviton:
 - a) Sensor: OSC05-RMW.
 - b) Relay / Transformer: OSP20-0D0.
 - 4) Pass & Seymour:
 - a) Sensor: CSD1000.
 - b) Relay / Transformer: PWP2120.

- 5) Schneider Electrical:
 - a) Sensor: SLSCDS801.
 - b) Relay / Transformer: SLSP1277.
 - 6) Sensorswitch:
 - a) Sensor: CMPDT9.
 - b) Relay / Transformer: MP-20:
 - 7) Watt Stopper:
 - a) Sensor: DT-305.
 - b) Relay / Transformer: BZ-50.
2. Wall, Infrared box type:
- a. Operable on 120 or 277 V systems.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Cooper Controls: OSW-P-1001-MV-W.
 - 2) Hubbell: LHIRS1W.
 - 3) Leviton: ODS10-IDW.
 - 4) Pass & Seymour: OS300S-W.
 - 5) Schneider Electric: SLSPWS1277CW.
 - 6) Sensorswitch: WSD-V-WH.
 - 7) Watt Stopper: PW-100-W.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install devices flush with walls, straight, and solid to box.
- B. Install surge protective device in knock-out of junction box installed on bottom of automatic sprinkler controller.

END OF SECTION

SECTION 26 2816
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install disconnects as described in Contract Documents, except those provided integral with equipment.
- B. Related Requirements:
 - 1. Section 26 0501: Common Electrical Requirements.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.
 - a. Disconnects: Same as Manufacturer of Project's main panelboard.
 - b. Fuses.
 - 1) Cooper Bussmann, Ellisville, IL www.cooperbussmann.com.
 - 2) Edison Fuse, Ellisville, IL (314) 391-3443.
 - 3) Ferraz Shawmut, Newburyport, MA www.ferrazshawmut.com.
 - 4) Littelfuse Inc, Des Plaines, IL www.littelfuse.com.
- B. Disconnects:
 - 1. Heavy-duty quick-make, quick-break type, non-fused unless indicated otherwise.
 - 2. Provide interlock to prevent opening of door when switch is in ON position.
 - 3. Provide means to lock switch in OFF position with padlock.
 - 4. Disconnects for motor circuits shall be horsepower rated.
 - 5. Enclosures:
 - a. Interior: NEMA / CEMA Type 1.
 - b. Exterior: NEMA / CEMA Type 3R.
 - 6. Fuses:
 - a. Fuse fused disconnects with dual-element time delay fuses and equip with rejection type fuse holders.
 - b. Fuses on Project shall be from single manufacturer.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Label disconnects to indicate electrical panelboard and feeding circuit, such as LB-24, and equipment served, such as Condensing Unit CU-1. Use 1/16 inch thick laminated plastic composition material with contrasting color core. Engraved letters shall be 1/4 inch high. Attach labels with screws.
- B. Install furnace disconnects on furnace at location where it is accessible from front of unit and it does not interfere with unit's operation.

END OF SECTION

**SECTION 26 5100
INTERIOR LIGHTING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install lighting system as described in Contract Documents, complete with lamps.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements'.
 - 2. Section 26 5121: 'Interior Lighting: LED Dimming Drivers'.
 - 3. Section 09 5116: 'Acoustical Tile Ceilings'.

1.2 REFERENCES

- A. Reference Standards:
 - 1. American National Standards Institute (ANSI):
 - a. ANSI C78.377-2015, 'American National Standard for Electric Lamps: Specification for the Chromaticity of Solid State Lighting Products'.
 - 2. Federal Communications Commission (FCC):
 - a. Code of Federal Regulations (CFR):
 - 1) FCC 47 CFR Part 18, 'Industrial, Scientific, and Medical Equipment'.
 - 3. Institute of Electrical and Electronics Engineers (IEEE):
 - a. IEEE C62.41.1-2002, 'Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits'.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Advance Transformer Co, Rosemont, IL www.advancetransformer.com.
 - b. Cooper Wiring Devices by Eaton, Peachtree City, GA www.cooperindustries.com.
 - c. General Electric Lighting, Hendersonville, NC or General Electric Lighting Canada Inc, Mississauga, ON www.gelighting.com/na.
 - d. Howard Lighting Products, Laurel, MS www.howard-ind.com.
 - e. Novitas Inc, Peachtree City, GA www.novitas.com.
 - f. Osram Sylvania, Danvers, MA www.sylvania.com or Osram Sylvania Ltd, Mississauga, ON (905) 673-6171.
 - g. Philips Lighting Co, Somerset, NJ www.lighting.philips.com/nam or Philips Lighting Canada, Scarborough, ON (416) 292-3000.
 - h. Universal Lighting Technologies, Nashville, TN www.universalballast.com.
 - i. Venture Lighting International, Solon, OH www.venturelighting.com.
 - j. Watt Stopper Inc, Santa Clara, CA www.wattstopper.com.
 - k. Westinghouse Lighting Corp, Philadelphia, PA www.westinghouselightbulbs.com.
 - 2. Product Options: When several lighting fixtures are specified by name for one use on Drawings, select any one of those specified. Do not mix fixtures from different manufacturers specified for one use.
- B. Materials
 - 1. Lighting Fixtures:
 - a. Type One Acceptable Products:
 - 1) See Fixture Schedule on Drawings for acceptable manufacturers and models.
 - 2) Equals as approved by Architect before bidding. See Section 01 6200.
 - 2. Fluorescent Ballasts:
 - a. Energy saving electronic for T8 lamps:
 - 1) Program rapid start type.
 - 2) Parallel circuit type.
 - 3) Minimum power factor of 95 percent.
 - 4) Maximum total harmonic distortion of 10 percent.
 - 5) Operation of lamps in compliance with Lamp Manufacturer's recommendations.
 - 6) Minimum starting temperature 0 deg F for T8 lamps.
 - 7) Class A sound rating.
 - 8) Transient protection in accordance with IEEE / ANSI C62.41.1, Category A.
 - 9) Comply with FCC 47 CFR Part 18.
 - 10) Ballast factor of 0.78.
 - 11) Maximum crest factor of 1.7.

- 12) Five year full replacement warranty including labor allowance for replacement.
 - 13) Input voltage to match system voltage.
 - 14) Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
 - a) IOP2PSP32LWSC by Advance.
 - b) GE32-MVPS-L by General Electric.
 - c) QHE-UNV-PSX-SC by Osram / Sylvania.
3. Fluorescent Dimming Ballasts:
- a. Electronic for T8 lamps:
 - 1) Programmed rapid start type.
 - 2) Series circuit type.
 - 3) Minimum power factor of 95 percent.
 - 4) Maximum total harmonic distortion of 20 percent.
 - 5) Operation of lamps in compliance with Lamp Manufacturer's recommendations.
 - 6) Minimum starting temperature 60 deg F.
 - 7) Class A sound rating.
 - 8) Transient protection in accordance with IEEE / ANSI C62.41.1, Category A.
 - 9) Comply with FCC 47 CFR Part 18.
 - 10) Maximum crest factor of 1.7.
 - 11) Five year full replacement warranty including labor allowance for replacement.
 - 12) Input voltage to match system voltage.
 - 13) Compatible with 0-10 VDC two-wire slide dimmer controller.
 - 14) Category Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
 - a) VZT-3S32 by Advance.
 - b) B332SSR77V5 by Universal Lighting Technologies.
 - c) QTP3x32T8/277 DIM5-Q by Osram / Sylvania.
4. Lamps:
- a. T8 Fluorescent Lamps:
 - 1) Minimum initial output of 3100 Lumens.
 - 2) Rated life of 40,000 hrs at 3 hrs per start for lamps operated on instant start ballasts.
 - 3) Minimum CRI 85.
 - 4) Meet Federal TCLP criteria.
 - 5) Category Four approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a) General Electric.
 - b) Howard.
 - c) North American Philips.
 - d) Osram / Sylvania.
 - 6) Correlated Color Temperature: 3000k.
 - b. Other Lamps:
 - 1) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a) General Electric.
 - b) North American Philips.
 - c) Osram / Sylvania.
 - d) Westinghouse.
 - c. LED Lamps and Fixtures:
 - 1) Replacement Lamps shall have minimum efficiency of 70 lm / W per LM 79.
 - 2) Integral LED Lamps shall have minimum efficiency of 90 lm / W per LM 79.
 - 3) Provide minimum rated life of 50,000 per LM 80 and LM 70 standards.
 - 4) Color Temperature: 3000k.
 - 5) Provide full spectrum color index of 65.
5. Daylight Lighting Switching System:
- a. Complete system enabling control of up to six 277V circuits by daylighting photocell mounted in skylight.
 - b. System components include, but are not limited to, following items. Except for photocell, install components in single, locking enclosure:
 - 1) 20 to 2000 foot candle photocell with necessary mounting hardware.
 - 2) Control relays or contactors and transformers for up to six circuits

- 3) Sensor controller with HIGH, LOW, and DEAD BAND adjustments.
- c. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - 1) Cooper Lighting.
 - 2) Watt Stopper.
- C. Factory Assembly:
 - 1. Fixtures shall be fully assembled complete with necessary wiring, sockets, lamps, reflectors, ballasts, auxiliaries, plaster frames, recessing boxes, hangers, supports, lenses, diffusers, and other accessories essential for complete working installation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work:
 - 1. Coordinate with Sections under 09 5000 heading to obtain symmetrical arrangement of fixtures in acoustic tile ceiling as shown on Reflected Ceiling Plan in Contract.
 - 2. In mechanical equipment rooms, coordinate locations of light fixtures with equipment locations to provide proper room illumination without obstruction. Suspend fixtures that must be mounted below pipes, ducts, etc, with chains or other Architect approved method.
- B. Securely mount fixtures. Support fixtures weighing 50 lbs or more from building framing or structural members.
- C. Fasten lay-in fluorescent fixtures to ceiling suspension system on each side with bolts, screws, rivets, or clips. In addition, connect lay-in fixtures with two (2) No. 12 gauge diagonal wires with three (3) turns each end; two (2) per fixture minimum to building framing or structural members. Connect to opposing corners of fixture. Wires may be slightly slack. Make final conduit connections to lay-in fluorescent fixtures with specified flexible conduit or flexible fixture whips.
- D. Where recessed fixtures are to be installed, provide openings, plaster rings, etc, of exact dimensions for such fixtures to be properly installed. Coordinate fixture installation with ceiling type and thickness. Terminate circuits for recessed fixtures in an extension outlet box near fixture and connect with specified flexible conduit.

3.2 ADJUSTMENT

- A. Repair scratches or nicks on exposed surfaces of fixtures to match original undamaged conditions.

END OF SECTION

SECTION 26 5121
INTERIOR LIGHTING: LED Dimming Drivers

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install Interior Lighting LED Dimming Drivers as described in Contract Documents, complete with lamps.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements'.
 - 2. Section 26 0924, 'Lighting Control System'.
 - 3. Section 26 2726: 'Wiring Devices'.
 - 4. Section 26 5100: 'Interior Lighting'.
- C. Reference Standards:
 - 1. American National Standards Institute (ANSI) / American National Standard Lighting Group (ANSLG):
 - a. ANSI/ANSLG C78.377-2011, 'American National Standard for Electric Lamps: Specification for the Chromaticity of Solid State Lighting Products'.
 - b. ANSI/ANSLG C82.11-2011, 'High-Frequency Fluorescent Lamp Ballasts'.
 - 2. American National Standards Institute (ANSI) / Illuminating Engineering Society (IES):
 - a. ANSI/IES RP-16-10, 'Nomenclature and Definitions for Illuminating Engineering'.
 - 3. Federal Communications Commission (FCC):
 - a. Code of Federal Regulations (CFR):
 - 1) FCC 47 CFR Part 15, 'Class B: Radio Frequency Devices'.
 - 4. Institute of Electrical and. Electronics Engineers (IEEE) / American National Standards Institute (ANSI):
 - a. IEEE/ANSI C62.41.1-2002, 'Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits'.
 - 5. International Electrotechnical Commission (IEC):
 - a. IEC 60929 ED. 4.0 B:2011, 'AC and/or DC Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements'.
 - b. IEC 61000-3-2:2005, 'Electromagnetic Compatibility (EMC) - Part 3-2: Limits for Harmonic Current Emissions (Equipment Input Current <= 16 A per phase)'.
 - c. IEC 61347-1 ED. 2.2 B:2012, 'Lamp Controlgear - Part 1: General and Safety Requirements'.
 - d. IEC 61347-2-13 ED. 1.0 B:2006, 'Lamp Controlgear - Part 2-13: Particular Requirements for d.c. or a.c. Supplied Electronic Controlgear for LED modules'.
 - e. IEC 61547 ED. 2.0 B:2009, 'Equipment for General Lighting Purposes - EMC Immunity Requirements'.
 - f. IEC 62384:2006, 'D.C. or A.C. Supplied Electronic Control Gear for LED Modules - Performance Requirements'.
 - g. IEC 62386-101 ED.1.0 B:2009, 'Digital Addressable Lighting Interface - Part 101: General Requirements - System'.
 - 6. National Electrical Manufacturers Association (NEMA):
 - a. NEMA 410-2011, 'Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts'.
 - 7. Underwriters Laboratories (UL):
 - a. UL 1310: 'Class 2 Power Units' (2011).
 - 8. Underwriters Laboratories (UL) / Underwriters Laboratories of Canada (ULC):
 - a. UL 8750: 'Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products' (2009).

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's published product data on dimensions, ratings, catalog numbers and identification of products and accessories for products included for project. Include performance data.
 - 2. Shop Drawings:
 - a. Provide fixture type(s) list for each specific driver.
 - b. Provide wiring diagrams as needed for special operation or interaction with other system(s).

- B. Informational Submittals:
 - 1. Qualification Statements:
 - a. Manufacturer: Provide experience compliance documentation.
 - b. Products: Provide compliance documentation with UL / ULC requirements.
- 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 on drivers.

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Meet UL / ULC requirements.
- B. Qualifications. Requirements of Section 01 4301 applies but not limited to following:
 - 1. Manufacturer:
 - a. Manufacture with five (5) years experience in manufacture of dimmable electronic lighting drivers.
 - b. Provide experience documentation.

1.4 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. General:
 - a. Proceed with installation only when following ambient conditions can be maintained:
 - 1) Install when the temperature is between minus 4 deg F minimum and 122 deg. F maximum and relative humidity is ninety (90) percent, non-condensing.
 - 2) Protect from dust and excess moisture during installation.

1.5 WARRANTY

- A. Manufacturer Warranty:
 - 1. Provide five (5) year warranty on drivers to operate driver at or below required driver warranty temperature.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

- A. Manufacturers:
 - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. eldoLED America, San Jose, CA www.eldoled.com.
 - b. General Electric Lighting, Hendersonville, NC or General Electric Lighting Canada Inc, Mississauga, ON www.gelighting.com/na.
 - c. Howard Lighting Products, Laurel, MS www.howard-ind.com.
 - d. OSRAM Sylvania, Danvers, MA or OSRAM Sylvania LTD, Mississauga, Ontario Canada www.Sylvania.com.
 - e. Philips Lighting Co, Somerset, NJ www.lighting.philips.com/nam or Philips Lighting Canada, Scarborough, ON (416) 292-3000.
- B. LED Dimming Driver:
 - 1. Description:
 - a. LED Dimming Driver:
 - 1) 4 wire (010V DC Voltage Controlled) Dimming Drivers.
 - 2) Digital (DALI Low Voltage Controlled) Dimming Drivers.
 - 3) Integral Diming Driver for replacement lamp.
 - 2. Design Criteria:
 - a. Driver:
 - 1) Driver must be able to operate for (+/- 10 percent) supply voltage of 120V through 277VAC at 60Hz.
 - 2) Driver to be UL / ULC recognized under component program and shall be modular for simple field replacement. Drivers that are not UL / ULC recognized or not suited for field replacement will not be used.
 - 3) Driver shall have ability to provide no light output when analog control signal drops below 0.5 V, or DALI digital signal calls for light to be extinguished and shall consume 0.5 watts or less in this standby. Control deadband between 0.5V and 0.65V shall be included to allow for voltage variation of incoming signal without causing noticeable variation in fixture to fixture output.

- b. Range and Quality:
 - 1) LED dimming to be equal in range and quality to commercial grade incandescent dimmer:
 - a) Quality of dimming to be defined by dimming range, freedom from perceived flicker or visible stroboscopic flicker, smooth and continuous change in level (no visible steps in transitions), natural square law response to control input, and stable when input voltage conditions fluctuate over what is typically experience in commercial environment.
 - 2) Ten-year expected life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
- c. Inrush Current:
 - 1) Driver must limit inrush current as followings:
 - a) Minimum Requirement: Meet or exceed NEMA 410 driver inrush standard of 430 amps per 10 amps load with maximum of 370 amps² per second.
 - b) Preferred Requirement: Meet or exceed 30mA²s at 277VAC for up to 50 watts of load and 75A at 240us at 277VAC for 100 watts of load.
- d. Withstand up to 1,000 volt surge without impairment of performance as defined by IEEE/ANSI C62.41.1 Category A.
- e. Light Output:
 - 1) No visible change in light output with variation of plus/minus 10 percent line voltage input.
- f. Harmonic Distortion:
 - 1) Total Harmonic Distortion less than 20 percent and meet ANSI/ANSLG C82.11 maximum allowable THD requirements at full output.
 - 2) THD shall at no point in dimming curve allow imbalance current to exceed full output THD.
- g. Automatic Adaptation:
 - 1) Driver must support automatic adaptation, allowing for future luminaire upgrades and enhancements and deliver improved performance.
 - a) Adjustment of forward LED voltage, supporting 3V through 55V.
 - b) Adjustment of LED current from 200mA to 1.05A at the 100 percent control input point in increments of 1 mA.
 - c) Adjustment for operating hours to maintain constant lumens (within 5 percent) over 50,000 hour design life of system, and deliver up to 20 percent energy savings early in life cycle.
- h. Light Quality:
 - 1) Over entire range of available drive currents, driver shall provide step-free, continuous dimming to black from 100 - 1 percent light output and step to 0 percent where indicated. Driver shall respond similarly when raising from 0 percent to 100 percent.
 - 2) Drivers to track evenly across multiple fixtures at all light levels, and shall have input signal to output light level that allows smooth adjustment over entire dimming range.
 - 3) Driver and luminaire electronics shall deliver illumination that is free from objectionable flicker as measured by flicker index (ANSI/IES RP-16-10). At all points within dimming range from 100-0.1 percent luminaire shall have:
 - a) LED dimming driver shall provide continuous step-free, flicker free dimming similar to incandescent source.
 - b) Minimum Requirement: Flicker index shall less that 5 percent at all frequencies below 1000 Hz.
 - c) Preferred specification: Flicker index shall be equal to incandescent, less that 1 percent at all frequencies below 1000 Hz.
- i. Control Input:
 - 1) 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers:
 - a) Must meet IEC 60929 ED. 4.0 B Annex E for General White Lighting LED drivers.
 - b) Connect to devices compatible with 0 to 1 OV Analog Control Protocol, Class 2, capable of sinking 0.6 ma per driver at low end of 0.3V. Limit number of drivers on each 0-1 OV control output based on voltage drop and control capacity.
 - c) Control relays or contactors and transformers for up to six circuits
 - d) Sensor controller with HIGH, LOW, and DEADBAND adjustments.
 - 2) Digital (DALI Low Voltage Controlled) Dimming Drivers:
 - a) Must meet requirements of IEC 62386-101 ED.1.0 B.

- 3) Integral Dimmer Driver for replacement lamps:
 - a) LED Driver shall not cause shadows.
 - b) LED Driver shall be line voltage controlled and shall be compatible with any universal dimmer.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Installation of driver to meet Manufacturer's prescribed methods and instructions.
- B. Meet Ambient Conditions requirements for installation.
- C. Driver may be remote mounted up to 300 ft depending on power level and wire gauge.
- D. 0-10V input shall be protected from line voltage miswire, and immune and output unresponsive to induced AC voltage on control leads.

END OF SECTION

**SECTION 26 5200
EMERGENCY LIGHTING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install emergency battery units as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements'.

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Beghelli, Miramar, FL www.beghelliusa.com.
 - b. Bodine Emergency Lighting, Collierville, TN www.bodine.com
 - c. Dual-Lite, Cheshire, CT www.dual-lite.com.
 - d. Iota Engineering Co, Tucson, AZ www.iotaengineering.com
 - e. Lightolier, Fall River, MA www.lightolier.com.
 - f. Lithonia Lighting, Conyers, GA www.lithonia.com.
 - g. McPhilben / Day-Brite Lighting, Tupelo, MS www.mcphilben.com.
 - h. Sure-Lites / Cooper Lighting, Elk Grove, IL www.cooperlighting.com.
- B. Materials:
 - 1. Fluorescent Battery Packs:
 - a. Design Criteria:
 - 1) Batteries shall be long life nickel cadmium type.
 - 2) Complete with charging indicator light and test switch.
 - 3) Components shall be fully concealed and easily accessible for maintenance or replacement.
 - 4) Factory installed in lighting fixture, or field installed to same standards.
 - b. Linear Fluorescent Lighting Fixtures:
 - 1) Battery pack shall operate one (1) lamp at approximately 600 lumens initially and 60 percent minimum of initial lumens after ninety (90) minutes.
 - 2) Charger shall be capable of full recharge in twenty four (24) hours.
 - c. Class Two Quality Products: See Section 01 4301 for Manufacturer Qualifications and Section 01 6200:
 - 1) Any Manufacturer that conforms to Contract Documents requirements.
 - 2. Emergency Lighting Units And Fixtures:
 - a. Design Criteria:
 - 1) Shall operate indicated number of lamps for ninety minutes of emergency operation.
 - 2) Sealed, maintenance free, lead calcium type battery.
 - 3) Painted steel housing and complete with power indicator light and test switch.
 - 4) Lamps to be designed for wet locations and with full vertical and horizontal adjustment of lamps.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) See Contract Drawings for approved fixtures. Coordinate emergency lighting unit and fixture so that systems function as required.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Battery Packs:
 - 1. General:
 - a. Wire so unit can be tested with lights on.
 - b. Wire so lamps in normal mode are switched off with other lighting in area. Connect unit to unswitched conductor of normal lighting circuit.
 - 2. Linear Fluorescent Lighting Fixtures:
 - a. Install in ballast channel of fixture with charging indicator light and test switch mounted on fixture end, or visible and accessible through lens.
- B. Emergency Lighting Units:
 - 1. Aim lamps to maximize lighting of first 50 feet of egress path.
 - 2. Wire so lamps are normally off and operate upon loss of normal building power.
 - 3. Connect units to un-switched conductor of normal lighting circuit.

END OF SECTION

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DIVISION 27: COMMUNICATIONS

27 1000 STRUCTURED CABLING

27 1501 COMMUNICATIONS HORIZONTAL CABLING

27 4000 AUDIO-VIDEO COMMUNICATIONS

27 4124 TV WALL MOUNTS

27 5000 DISTRIBUTED COMMUNICATIONS AND MONITORING SYSTEMS

27 5113 OVERHEAD PAGING SYSTEMS

END OF TABLE OF CONTENTS

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SECTION 27 1501
COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish, install, and test communications horizontal cabling as described in Contract Documents including following:
 - a. Cables and related terminations.
 - b. Patch cords and modular connectors.
 - c. Surface raceway and outlet poles.
 - d. Support and grounding hardware.
 - e. UTP Cable.
 - f. UTP Patch cords.
 - g. UTP Connector Modules.
 - h. Installation and testing of Owner Furnished Network Equipment.
- B. Related Requirements:
 - 1. Division 26: Raceways and surface boxes.
 - 2. Section 26 0526: 'Grounding And Bonding' for installation and termination.
 - 3. Section 26 0536: 'Cable Trays For Electrical Systems' for wire basket cable tray.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate with Project Manager and/or Facility Manager well in advance of Substantial Completion for installation of all Owner Furnished Network Equipment.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Provide Manufacturer's documentation, installation instructions, and descriptive information on each piece of equipment to be used.
 - 2. Shop Drawings:
 - a. Provide three (3) copies of labeling system reflecting approved label scheme for cable installation for racks, cables, panels, and outlets.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Provide Installer certificates of qualifications required.
 - 2. Design Data:
 - a. Identification and labeling:
 - 1) Provide labeling system for cable installation to be approved by Owner.
 - a) Clearly identify all components of system: racks, cables, panels and outlets.
 - b) Designate cables origin and destination and unique identifier for cable within facility by room number and port count.
 - c) Racks and patch panels shall be labeled to identify location within cable system infrastructure.
 - b. After system installation, provide three (3) full documentation sets to Consulting Engineer/Architect for approval.
 - 3. Tests And Evaluation Reports:
 - a. Submit documentation within ten (10) working days of completion of each testing phase. This is inclusive of all test results and record drawings.
 - b. Draft drawings may include annotations done by hand. Final copies of all drawings shall be submitted within thirty (30) working days of completion of each testing phase.
 - c. At request of Consulting Engineer, provide copies of original test results.
 - 4. Field Quality Control Submittals:
 - a. Architect will provide floor plans in paper and electronic formats on which record documentation information can be recorded.
 - 5. Qualification Statements:
 - a. Letter from Manufacturer certifying level of training and experience of Installer.
- C. Closeout Submittals:
 - 1. Include following information in Operations & Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Provide operating and maintenance instructions for each item of equipment submitted under Product Data.

- b. Warranty Documentation:
 - 1) Final, executed copy of Warranty.
- c. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature or cut sheet.
 - 2) Tests and evaluation reports.
 - 3) As-built Documentation:
 - a) Provide record document to include cable routes and outlet locations.
 - (1) Sequential number shall identify outlet locations.
 - (2) Numbering, icons, and drawing conventions used shall be consistent throughout all documentation.
 - (3) Provide labeling system information.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. System shall meet approval of authority having jurisdiction (AHJ). NEC and State and/or local ordinances and regulations shall govern unless more stringent requirements are specified.
 - 2. Meet all TIA/EIA commercial building wiring standards.
 - 3. Meet Telecommunications Distribution Methods Manual (TDMM) (12th Edition) requirements for installation and testing.
 - 4. All Networks shall be installed per applicable standards and manufacturer's guidelines.
 - 5. Cable assemblies shall be UL / CE Listed and CSA Certified. Cables shall be a distinctive green or green/yellow in color, and all jackets shall be UL, VW-1 flame rated.
 - 6. Grounding shall conform to all required Commercial Building Grounding and Bonding Requirements for Telecommunications, Electrical Codes, and Manufacturer's grounding requirements.
- B. Qualifications: Requirements of Section 01 4301 applies, but is not limited to following:
 - 1. Manufacturer Qualifications:
 - a. Provide single source for all products of system:
 - 1) KeyConnect by Belden.
 - 2) Netkey by Panduit.
 - 3) System 6 by Siemon.
 - 4) Uniprise Media 6 by CommScope.
 - 2. Installers Qualifications:
 - a. Approved and Certified by Manufacturer (installation and maintenance trained):
 - 1) Belden Certified System Vendor (CSV).
 - a) Belden Certified LDS Partner.
 - 2) CommScope Certified Business Partner.
 - a) CommScope Certified LDS Partner.
 - 3) Panduit Certified Installer (PCI).
 - 4) Siemon Certified Installers (CI).
 - b. Three (3) year experience with similar projects. Provide documentation.

1.5 WARRANTY

- A. Special Warranty:
 - 1. Cabling System:
 - a. Provide warranty for permanent link cabling system to meet Category 6 standard requirements for structured cabling system for twenty (20) years.
 - 2. Installer Warranty:
 - a. Installer guarantees that all work is in accordance with all express and implied requirements of Contract Documents, that all work is of good quality, and further warrants work and material for period of (1) year from date of substantial completion of project, unless longer period of time is specified in Contract. All work not conforming to these requirements, may be considered defective:
 - 1) If, within one (1) year after substantial completion of work, or within such longer period of time as may be prescribed by law or by terms of any warranty in Contract, any of work is found to be defective or not in accordance with Contract, Installer shall at Installer cost correct it promptly after receipt of written notice from Owner.
 - 2) Installer's obligation shall survive termination of Contract.
 - 3) Owner shall give such notice within reasonable time after discovery of condition.

- b. Installer warrants to Owner that all materials and equipment furnished under this Contract shall be new unless otherwise specified, free from faults and defects and in conformance with Contract Documents:
 - 1) Contractor shall secure manufacturer's warranties and deliver copies thereof to Owner upon completion of work.
 - 2) All such warranties shall commence from date of substantial completion, and will not in any way reduce Installer's responsibilities under his Contract.
 - 3) Whenever guarantees or warranties are required by specifications for longer period than one year, such longer period shall govern.
- c. Installer will provide twenty (20) year minimum end to end manufacturer warranty.

PART 2 - PRODUCTS

2.1 SYSTEMS

- A. Manufacturers:
 - 1. Category Four Approved Manufacturers and Products. See Section 01 6200 for definitions of Categories:
 - a. Belden, St. Louis, MO www.belden.com.
 - b. Panduit Corporation, Tinley Park IL www.panduit.com.
 - c. Systimax Solutions, a CommScope Company, Hickory, NC www.systimax.com.
 - d. The Siemon Company, Watertown, CT www.siemon.com.
- B. Design Criteria:
 - 1. Must install single manufacture as complete permanent link.
 - a. Category 6 minimum compliance margin on all parameters beyond category 6 and Power Sum ACR out to 250 MHz.
 - 2. Entire Category 6 system to be provided by single approved Manufacturer throughout.
 - 3. Install structured cabling system that will be able to support interconnections to active telecommunications equipment for voice and data applications in multi vendor, multi product environment. Structured cabling system should adhere to TIA-568, TIA-606; TIA-607, and TIA-942 standards with respect to pathways, distribution, administration, and grounding of the system.
 - 4. Each room drop will consist of two drops each consisting of two terminations can be interoperable to accommodate either voice or data applications. Provide convenience phone drops that will consist of single termination that will be installed in proper faceplate for each location's phone.
 - 5. Install, terminate, test, and guarantee each drop according to customer all applicable standards and customer preferences.
 - 6. Horizontal cables will be rated Category 6 (250 MHz) in performance and rated to comply with TIA-568 to connector outlets at Work Area. Horizontal cables will home run back to Technology Room (Entrance Facility / Main Cross Connect) and will terminate on individual Category 6 rated jacks to populate modular 48 port angled patch panel on open or flat patch panel inside enclosures. All cables will be patched at cutover as interconnection into floor serving active equipment using RJ45 modular equipment cables rated to Category 6.
 - 7. Match additions to horizontal raceway to complete system according to TIA-568 where suspension and protection gaps exist.
- C. Components – Work Area Subsystem:
 - 1. Provide connectivity equipment used to connect horizontal cabling subsystem and equipment in work area. Both copper and fiber media shall be supported. Connectivity equipment shall include following options:
 - a. Patch (equipment) cords and modular connectors.
 - b. Outlets and surface mount boxes.
 - c. Surface raceway and outlet poles.
 - d. Consolidation point / MUIO.
 - 2. Patch Cords and Modular Connectors:
 - a. Match horizontal cabling medium and rating. Same Manufacturer shall provide modular connectors and patch cords. Total patch cord length at work area is not to exceed 10 feet.
 - b. Copper Connectivity:
 - 1) Network Cabling System:
 - a) Provide for Work Area subsystem, including all modular connectors.
 - b) Modular connectors shall support of high-speed networks and applications designed for implementation on copper cabling.
 - c) Outlets shall utilize fully interchangeable and individual connector modules that mount side-by-side to facilitate quick and easy moves, adds and changes.

- 2) Modular Connections:
 - a) Data Modules shall be Category 6:
 - (1) Eight position modules required in all work areas and shall exceed connector requirements of TIA Category 6 standard.
 - (2) Prove termination cap with strain relief on cable jacket, ensure cable twists are maintained to within 1/8 inch and include wiring scheme label. Wiring scheme label shall be available with TIA-568 wiring schemes.
 - b) Terminations shall use for TIA-568 wiring scheme.
 - c) Modules shall terminate 4 pair 23 100-ohm solid unshielded twisted pair cable.
 - d) Modules shall meet ISO 11801 standard including complying with intermateability standard IEC 60603-7 for backward compatibility.
 - e) Category 6 modules shall have UL and CSA approval.
 - f) Modules shall have ETL verified Category 6 performance and ISO 11801 Class E performance in both basic and channel links.
 - g) Modules shall be universal in design, accepting 2, 3, or 4 pair modular plugs without damage to outer jack contacts.
 - h) Modules shall be able to be re-terminated minimum of 10 times and be available in 11 standard colors for color-coding purposes.
 - i) Jack shall snap into all outlets and patch panels.
 - j) Module shall include black base to signify Category 6 400 MHz performance.
- 3) Patch Cords:
 - a) Category 6 patch cords shall be factory terminated with modular plugs featuring one-piece, tangle-free latch design and strain-relief boots to support easy moves, adds, and changes.
 - b) Constructed with Category 6 23-AWG stranded UTP cable.
 - c) Each patch cord shall be one hundred (100) percent performance tested at factory in channel test to TIA Category 6 standard.
 - d) Patch cords shall come in standard lengths of 3, 5, 7, 9, 14 and 20 feet and 6 standard colors of Blue or White.
 - e) Provide one (1) each 8 feet patch cord for 50% of terminated work station ports.
3. Outlets and Surface Mount Boxes:
 - a. Outlets and surface mount boxes shall support network system by providing high-density in-wall, surface mount cabling applications.
 - b. Provide faceplates for flush mount:
 - 1) Outlets faceplates shall be manufactured from high-impact thermoplastic material with UL 94 flammability rating of 94 HB or better.
4. Copper Cable:
 - a. Design Criteria:
 - 1) Performance exceeds all TIA-568 Cat 6 and ISO 11801 for Class E cable requirements.
 - 2) ETL tested and verified for Category 6 component performance.
 - 3) Conductors are twisted in pairs with four pairs contained in flame retardant PVC jacket separated by a spline.
 - 4) Performance tested to 650 MHz.
 - 5) Plenum (CMP) and non-plenum/riser (CMR) flame rated.
 - 6) Maximum installation tension of 25 lbs (110 N).
 - 7) Installation temperature range: 32 deg F to 140 deg F.
 - 8) Operating temperature range: 14 deg F to 140 deg F.
 - 9) Cable diameter: Riser – 0.26 inch 0.260"; Plenum – 0.25 inch.
 - 10) Easy payout, reel-in-a-box and descending length markings on cable speed installation.
 - 11) Supports following applications: Ethernet 10BASE-T, 100BASE-T (Fast Ethernet) and 1000BASE-T (Gigabit Ethernet); 1.2Gb/s ATM; Token Ring 4/16; digital video; and broadband/baseband analog video.
 - 12) Color shall be blue.
- D. Horizontal Distribution Cabling:
 1. General:
 - a. Horizontal distribution cabling system is portion of telecommunications cabling system that extends from work area telecommunications outlet/connector to horizontal cross-connect in Technology Room (Entrance Facility / Main Cross Connect).
 - 1) Horizontal cabling in office should terminate in Technology Room (Entrance Facility / Main Cross Connect) located on same floor as Work Area being served.

- 2) Horizontal cabling is installed in star topology (home run).
- 3) Bridged taps and splices are not permitted as part of copper horizontal cabling.
- E. Components – Technology Room (Entrance Facility / Main Cross Connect):
 - 1. General:
 - a. Connect networking equipment to horizontal and backbone cabling subsystems:
 - 1) Termination hardware (connectors and patch cords), racks, cable management products and cable routing products.
 - 2) Cable termination hardware.
 - b. Terminate each horizontal or backbone cabling run using appropriate connectors or connecting blocks depending upon cable type:
 - 1) Matching patch cords will be used to perform cross-connect activities or to connect into the networking/voice hardware:
 - a) Category 6 Enhanced Unshielded Twisted Pair (UTP).
 - c. Four-pair Category 6 UTP cabling shall be terminated onto four-pair Category 6 module:
 - 1) All modules shall be terminated using 568-B wiring scheme.
 - 2) Eight position module shall exceed connector requirements of TIA Category 6 standard.
 - 3) Jack termination to 4-pair, 100 ohm solid unshielded twisted pair cable shall be by use of forward motion termination cap and shall not require use of punchdown or insertion tool.
 - 2. Rack, Cabinet, and Cabling Management Enclosure:
 - a. Cable Management:
 - 1) Cable Management System shall be used to provide neat and efficient means for routing and protecting fiber and copper cables and patch cords on telecommunication racks and enclosures.
 - 2) Provide complete cable management system comprised of vertical and horizontal cable managers to manage cables on both front and rear of rack.
 - 3) System shall protect network investment by maintaining system performance, controlling cable bend radius and providing cable strain relief.
 - b. Vertical Cable Management:
 - 1) General:
 - a) Vertical cable managers include components that aid in routing, managing and organizing cable to and from equipment.
 - b) Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief.
 - 2) Provide panels with universal design mounting to 19 inches rack and constructed of steel bases with PVC duct attached.
 - 3) Covers shall be able to hinge from either side yet still be easily removed to allow for quick moves, adds, and changes.
 - c. Horizontal Cable Management:
 - 1) General:
 - a) Horizontal cable managers include components that aid in routing managing and organizing cable to and from equipment.
 - b) Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief.
 - 2) Provide panels with universal design mounting to 19 inches rack and constructed of steel bases with PVC duct attached.
 - 3) Duct fingers shall include retaining tabs to retain cables in place during cover removal.
 - 4) Covers shall be able to hinge from either side yet still be easily removed to allow for quick moves, adds, and changes.
 - 3. Patch Cords:
 - a. Provide patch cords between modular patch panels configured as cross-connect or between patch panel and networking hardware when patch is used as interconnect. Provide one (1) each 3 feet patch cord for each terminated patch panel port.
 - b. Provide patch cords as indicated on Drawings and Specifications as shown in Contract Documents. Ensure all devices are fully connected to network equipment.
 - c. Provide additional patch cords with appropriate length to connect all Owner provided internet enabled appliances (IEA) as specified on TT (Technology Telecommunication) and TA (Technology Audiovisual) Drawings as shown in Contract Documents.
 - d. Patch cords shall be factory terminated with modular plugs featuring one-piece, tangle-free latch design and black strain-relief boots to support easy moves, adds and changes.

- e. Construct patch cords with Category 6 24-AWG stranded UTP cable.
- f. Patch cords shall be one hundred (100) percent performance tested at factory in channel test to Category 6 standard.
- 4. Patch Panels:
 - a. Four-pair Category 6 UTP cabling shall be terminated onto four-pair-punch-down style connecting hardware mounted to rear of integral patch panels and routed to Category 6 modules on front face of patch panel.
 - b. Patch panels shall be universal for TIA-568 wiring configurations.
 - c. Patch panels shall have removable 6-port design that allows 6-port module to be removed without disrupting other ports.
 - d. Integral cable tie mounts shall be included in panel for cable management on back of panel.
 - e. Port and panels shall be easy to identify with write-on areas and optional label holder for color-coded labels.
 - f. Rack mountable patch panels shall mount to standard 19 inches rack.
- 5. Grounding and Bonding:
 - a. Provide Telecommunications Bonding Backbone:
 - 1) Ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has potential to act as current carrying conductor.
 - 2) Install telecommunication Bonding Backbone independent of building's electrical and building ground.
 - 3) Designed in accordance with recommendations contained in TIA-607 Telecommunications Bonding and Grounding Standard.
 - b. All wires used for telecommunications grounding purposes shall be identified with green insulation:
 - 1) Non-insulated wires shall be identified at each termination point with wrap of green tape.
 - 2) All cables and bus bars shall be identified and labeled as required.
- 6. Firestopping: Furnish and install firestopping as per Section 07 8400.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Install communications system in accordance with Manufacturer's written instructions, and complying with applicable portions of NEC 'Standard of Installation'.
- B. Work Area Outlets:
 - 1. Cables shall be coiled in in-wall or surface-mount boxes if adequate space is present to house cable coil without exceeding Manufacturers bend radius.
 - a. No more than 12 inches of UTP slack shall be stored in in-wall box, modular furniture raceway, or insulated walls.
 - b. Excess slack shall be loosely configured and stored in ceiling above each drop location when there is not enough space present in outlet box to store slack cable.
 - 2. Cables shall be dressed and terminated in accordance with TIA-568, Manufacturer's recommendations, and best industry practices.
 - 3. Cables shall be bundled using Velcro straps at least 0.25 inch wide. Use of plastic wire ties or zip ties is not allowed on project.
 - 4. Pair untwist at termination shall not exceed 0.125 inch.
 - 5. Bend radius of cable in termination area shall not be less than 4 times outside diameter of cable.
 - 6. Cable jacket shall be maintained to within one inch of termination point.
 - 7. Data / voice jacks, unless otherwise noted in Contract Documents, shall be located on each faceplate.
 - 8. Horizontal Cabling:
 - a. Data jacks in horizontally oriented faceplates shall occupy rightmost position(s).
 - b. Voice jacks shall occupy the top position(s) on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).
- C. Horizontal Cross Connect:
 - 1. Cables shall be dressed and terminated in accordance with TIA-568, Manufacturer's recommendations, and best industry practices.
 - 2. Pair untwist at termination shall not exceed 0.125 inch.
 - a. Bend radius of cable in termination area shall not be less than 4 times outside diameter of cable.

3. Cables shall be neatly bundled and dressed to their respective panels or blocks.
 - a. Each panel or block shall be fed by individual bundle separated and dressed back to point of cable entrance into rack or frame.
 - b. Cables shall be bundled using Velcro straps at least 0.25 inch wide. Use of plastic wire ties or zip ties is not allowed on project.
4. Cable jacket shall be maintained as close as possible to termination point.
5. Each cable shall be clearly labeled on cable jacket behind patch panel at location that can be viewed without removing bundle support ties.
 - a. Cables labeled within bundle, where label is obscured from view shall not be acceptable.
6. Horizontal Cabling:
 - a. A pull cord (nylon; 1/8 inch minimum) shall be co-installed with all cable installed in any conduit.
 - b. Cable raceways shall not be filled greater than required by TIA-569 maximum fill for particular raceway type.
 - c. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
 - d. Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in enclosure intended and suitable for purpose.
 - e. Cable's minimum bend radius and maximum pulling tension shall not be exceeded.
 - f. If J-hook or trapeze system is used to support cable bundles, all horizontal cables shall be supported at 48 inch to 60 inches maximum intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.
 - g. Horizontal distribution cables shall be bundled in groups of no more than 25 cables. Cable bundle quantities in excess of 25 cables may cause deformation of bottom cables within bundle and degrade cable performance.
 - h. Cables shall be bundled using Velcro straps at least 0.25 inch wide. Use of plastic wire ties or zip ties is not allowed on project.
 - i. Cable shall be installed above fire-sprinkler systems and shall not be attached to system or any ancillary equipment or hardware. Cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
 - j. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, install appropriate carriers to support cabling.
 - k. Cables shall be identified by self-adhesive label and meet requirements of TIA-606. Cable label shall be applied to cable behind faceplate on section of cable that can be accessed by removing cover plate.
 - l. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in run and at termination field.
 - m. Pulling tension on 4-pair UTP cables shall not exceed 25 lbf for a four-pair UTP cable.
- D. Vertical Outlet Pole And Surface Raceway:
 1. Horizontal Cabling:
 - a. General:
 - 1) Vertical outlet poles and Surface Raceway refers to surface raceway system used for branch circuit wiring and/or data network, voice, video and other low-voltage cabling. Surface raceway shall be used in solid wall applications or for applications where moves, additions and changes are very typical to workflow.
 - b. Raceway system shall consist of raceway, appropriate fittings and accessories to complete installation per electrical Contract Documents. Non-metallic surface raceway is to be utilized in dry interior locations only as covered in Article 352, part B of the NEC, as adopted by the NFPA and as approved by the ANSI.
- E. Copper Termination Hardware:
 1. Cables shall be dressed and terminated in accordance with TIA-568, Manufacturer's recommendations, and best industry practices.
 2. Pair untwist at termination shall not exceed 0.125 inch.
 - a. Bend radius of cable in termination area shall not be less than 4 times outside diameter of cable.
 3. Cables shall be neatly bundled and dressed to their respective panels or blocks.
 - a. Each panel or block shall be fed by individual bundle separated and dressed back to point of cable entrance into rack or frame.
 - b. Cables shall be bundled using Velcro straps at least 0.25 inch wide. Use of plastic wire ties or zip ties is not allowed on project.

4. Cable jacket shall be maintained as close as possible to termination point.
5. Each cable shall be clearly labeled on cable jacket behind patch panel at location that can be viewed without removing bundle Velcro support straps.
 - a. Cables labeled within bundle, where label is obscured from view shall not be acceptable.
- F. Grounding System:
 1. Where required, Telecommunications Bonding Backbone shall be designed and/or approved by qualified Installer.
 2. Follow requirements of TIA-607.
- G. Seismic Bracing:
 1. Comply with IBC and local seismic requirements for all equipment and conduit pathways.
- H. Identification and Labeling:
 1. Apply machine generated approved labeling for racks, cables, panels and outlets:
 - a. Designate cables origin and destination and unique identifier for cable by room name and/or number and port count.
 - b. Racks and patch panels shall be labeled to identify location within cable system infrastructure.
 2. Place labeling within view at termination point on each end.
 3. Outlet, patch panel and wiring block labels shall be installed on, or in, space provided on device.
 4. See Contract Drawings for labeling scheme.
 5. Conform to IP addressing assignments as listed in Attachment 'FACILITIES ZONE IP ADDRESS ASSIGNMENT TABLE'.
 - a. See Attachment 'FACILITIES ZONE IP ADDRESS ASSIGNMENT TABLE' for 'IP Address Assignments.

3.2 FIELD QUALITY CONTROL

- A. Field Tests:
 1. Provide testing upon completion of installation.
 - a. General:
 - 1) Testing to be in accordance with TIA standards and Manufacturer's system warranty guidelines and best industry practice.
 - a) If any of these are in conflict, discrepancies shall be brought to attention of Architect/Consulting Engineer for clarification and resolution.
 - b. Cables and termination hardware:
 - 1) Test complete system for defects in installation.
 - 2) Verify cabling system performance under installed conditions according to requirements of TIA-568:
 - a) All pairs of each installed cable shall be verified prior to system acceptance.
 - b) Any defect in cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure one hundred (100) percent useable conductors in all cables installed.
 - c. Copper channel testing:
 - 1) All twisted-pair copper cable links shall be tested for compliance to requirements of TIA-568 for appropriate Category of cabling installed.
 - 2) Backbone multimode fiber cabling shall be tested at both 850 nm and 1300 nm.
 - d. UTP Cables and Links testing:
 - 1) UTP cabling channel must be tested at swept frequencies up to 250 MHz for internal channel performance parameters as defined in IEEE 802.3 and TIA-568. Certifications shall include following parameters for each pair of each cable installed:
 - a) Wire map (pin to pin connectivity).
 - b) Length (in feet or millimeters).
 - c) Near End Crosstalk (NEXT).
 - d) Far End Crosstalk (FEXT).
 - e) ELFEXT.
 - f) Attenuation/Crosstalk Ration (ACR).
 - g) Return Loss.
 - h) Propagation Delay.
 - i) Delay Skew.
 - j) Test equipment shall provide electronic and printed record of these tests.
 - 2) Test each pair of cable for opens, shorts, grounds, and pair reversal.
 - a) Correct short or grounded and reversed pairs.

- b) Examine open and shorted pairs to determine if problem is caused by improper termination.
 - c) If termination is proper, tag bad pairs at both ends and note on termination sheets.
 - d) If horizontal cable contains bad conductors, remove and replace cable.
 - e. Testing Equipment:
 - 1) Comply with requirements of TIA-568.
 - a) Appropriate level III tester shall be used to verify Category 6 cabling systems.
 - 2) UTP Cables and Links test equipment:
 - a) Category Four Approved Testing Equipment. See Section 01 6200 for definitions of Categories:
 - (1) Fluke Networks DTX-1800 with firmware version 2.04 or later.
 - (a) Test lead to be P/N DTX-PLA001 or PLA002 universal permanent link interface adapter.
 - (2) Agilent Wireshcope Pro N2640A with firmware version 2.1.9 or later.
 - (a) Test lead to be P/N N2644A-101 universal CAT6A link smart probes.
 - f. Re-Testing:
 - 1) Consulting Engineer may request ten (10) percent random field re-test to be conducted on cable system, at no additional cost to Owner, to verify documented findings.
 - a) Tests shall be repeat of those defined above.
 - b) If findings contradict documentation submitted, additional testing can be requested to extent determined necessary by Consulting Engineer, including one hundred (100) percent re-test at no additional cost to Owner.
 - g. Tests And Evaluation Reports:
 - 1) Printouts generated for each cable by wire test instrument shall be submitted as part of documentation package. Installer may furnish this information in electronic form.
 - a) Media shall contain electronic equivalent of test results as defined by the Section along with software necessary to view and evaluate test reports.
 - 2) Submit documentation within ten (10) working days of completion of each testing phase. This is inclusive of all test results and record drawings.
 - 3) Draft drawings may include annotations done by hand. Final copies of all drawings shall be submitted within thirty (30) working days of completion of each testing phase.
 - 4) If requested by Consulting Engineer, provide copies of original test results.
 - h. Test Documentation:
 - 1) Provide electronic format documentation within three (3) weeks after completion of project.
 - 2) Documentation shall be clearly marked on outside front cover with following:
 - a) "Project Test Documentation".
 - b) Project name.
 - c) Date of completion (month and year).
 - 3) Test results shall include following:
 - a) Record of test frequencies.
 - b) Cable type.
 - c) Conductor pair and cable (or outlet) I.D.
 - d) Measurement direction.
 - e) Reference setup.
 - f) Crew member name(s).
 - g) Test equipment name, manufacturer, model number, serial number, software version.
 - h) Last calibration date:
 - (1) Unless Manufacturer specifies more frequent calibration cycle, annual calibration cycle is required on all test equipment used on project.
 - (2) Document shall detail test method used and specific settings of equipment during test as well as software version being used in field test equipment.
- B. Non-Conforming Work: Non-conforming work as covered in General Conditions applies, but is not limited to following:
 - 1. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced at no additional cost to Owner.
 - 2. Any defect in cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to

- ensure one hundred (100) percent useable conductors in all cables installed at no additional cost to Owner.
3. Correct deviation and repeat applicable testing at no additional cost to Owner.
 4. Correct any work found defective or not complying with Association Publications and TDMM requirements at no additional cost to Owner.
 - a. Document all problems found and corrective action taken.
 - b. Include both failed and passed test data.

END OF SECTION

Facilities Zone IP Address Assignments

Installers connecting any equipment to the Facilities Zone shall conform to the IP addressing assignments listed in the Table below.

- For each device listed, the Device must be statically assigned the IP Address that is given by adding the specified offset in the table to the Facility Zone Gateway address.
- IP addresses should follow standard IPv4 Octet form.
- The respective Device installer is responsible for setup of the device.
- Structured Cabling Installer shall post a copy of this list near the Firewall, with the Gateway address filled in.

FACILITIES ZONE IP ADDRESS ASSIGNMENT TABLE	
Facility Zone Gateway Address	10.____.____.____
Device Name	Gateway Offset
Fire Alarm	1
Security System	2
Condenser Theft Detection System	3
Access Control	4
Lighting Controller	5
Webstat Thermostat	6
Irrigation	7
Solar Panel Charge Controller	8
DSP1	9
DSP2	10
Surge Suppressor 1	11
Surge Suppressor 2	12
Contrio 1 - Chapel (MA)	13
Contrio 2 - Rack (KP)	14
Contrio 3 - Relief Society (SV8)	15
Contrio 4 - Children's Room (SV8)	16
Contrio 5 - Priesthood/ Multi-Purpose (SV8)	17
Power Amp (1)	18
Satellite Receiver #1	19
Satellite Receiver #2	20
Open	21
Open	22
Open	23
Open	24

SECTION 27 4124
TV DISPLAY AND WALL MOUNTS

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install TV wall mount as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 06 2001: 'Common Finish Carpentry Requirements' for:
 - a. Wall blocking for TV wall mounts, and installation of TV wall mounts.
 - 2. Division 26: 'Electrical' for electric outlets required for TV's.
 - 3. Division 27: 'Communications' for data connections required for TV's.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Provide Manufacturer's written installation instructions.

1.3 WARRANTY

- A. TV's: Provide Manufacturer's warranty against any manufacturing defect and workmanship.
- B. TV Mounts: Manufacturer's 10-year warranty.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. TV Display:
 - 1. Description:
 - a. Flat panel TV sourced from any reputable retailer.
 - 2. Design Criteria:
 - a. Brand: LG or Samsung
 - b. Type: Direct Lit LED-LCD
 - c. Size: 65 inch
- B. TV Wall Mounts:
 - 1. Description:
 - a. Large Flat Panel TV Swing Arm Wall Display Mount allowing for perfect display placement and ideal viewing from any angle and remains low-profile in home position.
 - 2. Design Criteria:
 - a. Adjustable tilt mechanism.
 - b. Mounting system secures flat panel to mount.
 - c. Typical Screen Sizes: 42 inch to 71 inch.
 - d. UL Listed.
 - e. Weight Capacity: 200 lbs General:
 - f. Lateral shift: 9 inch Manual Height Adjustment: 1 inch
 - g. Maximum Extension: 37 inch extension.
 - h. Minimum Depth: 3.4 inch
 - i. Mounting Pattern Compatibility (Universal Versions): 200 x 200mm - 862 x 517mm.
 - j. Orientation: landscape and portrait.
 - k. Overall Dimensions 22 inches high x39.5 inches wide x3.4 inches deep.
 - l. Tilt: +5 deg, -16 deg.
 - 3. Color: Black.
 - 4. Type One Acceptable Products:
 - a. PDRUB / PDR Series Large Flat Panel Swing Arm Wall Display Mount - 37 inch extension by Chief (Division of Milestone AV Technologies), Eden Prairie, Minnesota www.milestone.com.
 - b. Equals as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verification of Conditions:
 - 1. Verify wall blocking in stud wall is in correct location before beginning installation.

3.2 INSTALLATION

- A. Installing TV Wall Mount to Wall:
 - 1. Follow Manufacturer's written installation instructions for anchoring to wall.
 - 2. Install Mount so that top of TV is 3 inch minimum from ceiling.
 - 3. Install at locations shown on Contract Drawings.

END OF SECTION

**SECTION 27 5113
OVERHEAD PAGING SYSTEMS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install overhead paging system as described in Contract Documents that shall be accessible through telephone system and provide background music to designated zones. Requirements for paging system components include, but not limited to:
 - a. Power Amplifiers.
 - b. Speaker systems (compatible with existing speakers to be reused).
 - c. Page zone controller.
 - d. Volume controls.
 - e. Wiring and cable.
 - 2. Rough-in material to be furnished and installed by Division 26 including but not limited to:
 - a. Conduit.
 - b. Junction boxes.
 - c. Device enclosures.
 - d. Wiring cable tray.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements'.
 - 2. Section 26 0533: 'Raceway And Boxes For Electrical Systems' for conduit, junction boxes, and other related items for paging system.
 - 3. Section 26 0536: 'Cable Trays For Electrical Systems' for cable tray for overhead paging system wiring.

1.2 REFERENCES

- A. Reference Standards:
 - 1. National Fire Protection Association:
 - a. NFPA 70, 'National Electrical Code (NEC)' (2017 or most recent edition adopted by AHJ).
 - 2. Underwriters Laboratories:
 - a. UL 50: Enclosures for Electrical Equipment, Non-Environmental Considerations (October 2015 13th Edition).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate efforts of various trades affected by the Work of this Section.
 - 2. Coordinate the Work of this Section with requirements of Owner's paging system technicians and perform following:
 - a. Meet jointly with Owner's Representative(s), to exchange information and agree on details of installation interfaces with BGM sources, system operation including zone identification and classification, and any other circumstances that impact on completion of work of this Section.
 - b. Record agreements reached in meeting and distribute record to other participants.
- B. Pre-Installation Conference:
 - 1. Participate in pre-installation conference as specified in Section 01 3100:
 - 2. Schedule pre-installation conference prior to installation of overhead paging system installation.
 - 3. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review installation scheduling, coordination and installation of paging system.
 - b. Review delivery, storage and handling of material and equipment requirements.
 - c. Review requirement for examining existing conditions with Architect and/or Owner present, for compliance with requirements and other conditions affecting performance of overhead paging system work as specified in Part 3 of this specification:
 - 1) Review compliance of following items before beginning overhead paging system installation:
 - a) No cables spliced except at standard barrier terminal blocks inside equipment cabinet.
 - b) Cables marked at each end with permanent wire labels such as Brady or equal.
 - c) Isolated ground run back to main electrical panel from paging equipment cabinet.
 - d) Specified conduit, cables, speaker enclosures and equipment cabinets are properly installed.
 - d. Review pre-testing requirements specified in Part 3 of this specification.

1.4 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Provide product data for each type of product specified.
 - 2. Shop Drawings:
 - a. Provide detailing equipment layout elevations and specific installation requirements.
 - b. Wiring Diagrams detailing wiring for power, signal, and control, differentiating clearly between manufacturer-installed wiring and field-installed wiring. Identify terminal numbers and wiring color codes to facilitate installation, operation, and maintenance.
- B. Informational Submittals:
 - 1. Qualification Statement:
 - a. Installer:
 - 1) Provide documentation of experience qualification if requested by Architect or Owner's Representative.
- 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.

1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. System shall be installed in accordance with applicable standards, requirements, and recommendations of International Building Code, National Electrical Code and all local authorities having jurisdiction.
- B. Qualifications:
 - 1. Installer. Requirements of Section 01 4301 applies, but not limited to following:
 - a. Approved Installers:
 - 1) Engage an experienced Installer who is factory-authorized sales and service representative of those manufacturers specified to perform work of this Section.
 - 2) Upon request, submit documentation of compliance of qualifications before bid to Architect or Owner's Representative.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
 - 1. Store in clean, dry space in original containers. Protect products from fumes and construction traffic. Handle carefully to avoid damage.

1.7 WARRANTY

- A. Special Warranty:
 - 1. Provide complete warranty repair or replacement for one (1) year at no cost to Owner, except in case of obvious abuse.
 - 2. Disclaimers and Limitations:
 - a. Manufacturer's disclaimers and limitations on product warranties do not relieve Installer of warranty on Work that incorporates products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with Installer.
 - 3. Reinstatement of Warranty:
 - a. When Work covered by a warranty has failed and been corrected by replacement of rebuilding, reinstate warranty by written endorsement. Reinstated warranty shall be equal to original warranty.
 - 4. Related Damages and Losses:
 - a. When correcting warranted Work that has failed, remove and replace other Work that has been damaged as result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
 - 5. Replacement Cost:
 - a. Upon determination that Work covered by warranty has failed, replace or rebuild the Work to acceptable condition complying with requirements of Contract Documents.
 - b. Installer is responsible for cost of replacing or rebuilding defective Work regardless of whether Owner has received benefit from use of the Work through portion of its anticipated useful service life.

6. Owner's Recourse:
 - a. Written warranties made to Owner are in addition to implied warranties, and shall not limit duties, obligations, rights and remedies otherwise available under law, nor shall warranty periods be interpreted as limitations on time in which Owner can enforce such other duties, obligations, rights, or remedies:
 - 1) Rejection of Warranties: Owner reserves right to reject warranties and to limit selections to products with warranties not in conflict with requirements of Contract Documents.
7. Owner reserves right to refuse to accept Work for Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

PART 2 - PRODUCTS

2.1 SYSTEMS

- A. Manufacturers:
 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Atlas Sound, Phoenix, AZ www.atlasied.com.
 - b. Bogen Communications, Inc., Mahwah NJ www.bogen.com.
 - c. RDL (Radio Design Labs), Prescott, AZ www.rdlnet.com.
 - d. Middle Atlantic Products (Div of Legrand), Fairfield, NJ www.middleatlantic.com.
- B. Description:
 1. Overhead paging system shall be complete system for amplifying sound signals from new paging controller and distributing them to zone amplifiers and loudspeakers.
 2. Distribution to loudspeakers shall be through individually wired zones, with independent amplifiers.
 3. System shall be configured for three zones with 'all call'.
 4. Paging zone controller shall accommodate zone selection using direct dial through telephone system.
- C. General:
 1. Provide complete and fully functional overhead paging systems using materials and equipment of types, sizes, ratings, and performances as indicated.
 2. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction in accordance with published product information.
 3. Coordinate features of materials and equipment so they form integrated system with components and interconnections matched for optimum performance of specified functions.
- D. Design Criteria:
 1. Functional Performance:
 - a. Components and system features and functions shall include, but are not limited to, the following:
 - 1) Meet the following performance parameters as measured in 1/3 octave bands.
 - a) From 100 Hz to 2kHz, flat within plus or minus 2dB.
 - b) Above 2kHz, slope down along an approximate 3dB octave slope to 8kHz.
 - 2) When driven to maximum output, clipping shall first occur in power amplifiers.
 - 3) No noise, hum, RFI pickup or distortion shall be audible under normal operating conditions.
 - 4) Overhead paging system shall reproduce program material at level of 85 dBA without audible distortion.
- E. Equipment And Materials:
 1. General:
 - a. Provide all solid-state components fully rated for continuous duty at ratings indicated or specified.
 - b. Select equipment for normal operation on input power supplied at 105-130 V, 60 Hz.
 2. Paging Zone Controller:
 - a. Allow maximum of 3 zones using line level outputs.
 3. Paging Amplifiers:
 - a. Rack mounted, and sized to power number of speakers shown on Contract Drawings plus 25 percent.
 - b. Output power rating shall reflect an Aall call@ situation with all speakers in all zones being utilized.

4. Beam And Wall Mounted Speakers:
 - a. Provide loudspeakers with indoor/outdoor 2 way speaker system with C type mounting bracket.
 - b. Provide speaker with internally mounted 70 volt matching transformer with power taps from 1 to 60 watts.
5. Provide necessary power supplies as recommended for specific equipment.
6. Wire and cable:
 - a. Provide stranded copper, unshielded, twisted-pair, except where manufacturer recommends shielded cable and with conductors sized as also recommended.
 - b. Provide plenum rated cable in all spaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
 1. Examine existing conditions, with Architect and/or Owner present, for compliance with requirements and other conditions affecting performance of Overhead Paging System work.
 - a. Notify Architect of unsuitable conditions in writing.
 - b. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General:
 1. Install system in accordance with NFPA 70 'National Electrical Code' and other applicable codes.
 2. Install equipment in accordance with manufacturer's written instructions.
- B. Speakers:
 1. Confirm polarity of speaker before installation and wire to maintain uniform polarity.
 2. Provide brackets, screws, adapters, springs, rack mounting kits, etc., recommended by manufacturer for correct assembly and installation of speaker assemblies and electronics components
- C. Amplifier And Electronics:
 1. Assure sufficient ventilation for adequate cooling of equipment.
 2. Securely fasten equipment plumb and square in place according to manufacturer recommendations.
 3. Securely fasten relays and small components. Do not use sticky-back tape for fasteners.
 4. Connect powered components to 120 VAC outlets on transient voltage surge suppressor.
5. Cables:
 - a. Leave sufficient service loops of uniform length.
 - b. Do not parallel or branch cables and lines except at standard barrier terminal blocks using spade lugs. Label all zone cabling.
 - c. Secure cables to equipment cabinet with wire ties to ensure neat installation.
 - 1) Do not use double-stick tape or sticky-back cable anchors.
 - 2) Keep speaker level, line level, and microphone level cables in separate runs and bundles.
 - d. Connect spade lugs to cables by soldering or by securely crimping with compression type crimpers.
6. Identification:
 - a. Legibly identify user operated system controls and system input/output jacks using engraved, permanently attached laminated plastic plates or imprinted Lexon labels.
 - b. Label equipment and controls within equipment cabinet using similar labels or 'Kroy' type labels.

3.3 REPAIRS

- A. Wherever walls, ceilings, floors, or other building finishes are cut for installation, Installer shall be responsible to repair, restore, and refinish to original appearance.

3.4 FIELD QUALITY CONTROL

- A. Field Tests:
 1. Pre-Testing:
 - a. Upon completing installation of paging system, align, adjust, and balance system and perform complete pretest.
 - 1) Determine conformance of paging system to requirements of Contract Drawings and Specifications.
 - 2) Correct deficiencies observed. Replace malfunctioning or damaged items with new, and retest until materials satisfactory performance and conditions are achieved.

B. Manufacturer Services:

1. Provide services of factory authorized service representative to supervise field assembly and connection of components and pre-testing, testing, and adjustment of system.

3.5 ADJUSTING

A. Commissioning:

1. Occupancy Adjustment:

- a. When requested by Architect, Owner's Representative or Sound/Acoustical Consultant within one (1) year of date of substantial completion, provide on-site assistance in adjusting sound levels, resetting matching transformer taps, and adjusting controls to suit actual occupied conditions.
- b. Provide two (2) trips for this purpose.

3.6 CLEANING

A. General:

1. Prior to substantial completion, clean system components.

3.7 PROTECTION

A. General:

1. Protect system components from damage and deterioration.

END OF SECTION

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DIVISION 28: ELECTRONIC SAFETY AND SECURITY

28 2000 ELECTRONIC ACCESS CONTROL AND INTRUSION DETECTION

28 2900 DETECTION AND ANNUNCIATION

28 3000 ELECTRONIC DETECTION AND ALARM

28 3101 FIRE DETECTION AND ALARM SYSTEM

END OF TABLE OF CONTENTS

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**SECTION 28 2900
DETECTION AND ANNUNCIATION**

PART 1 - GENERAL**1.1 SUMMARY**

A. Includes But Not Limited To:

1. Furnish and install wireless detection and annunciator system as described in Contract Documents.

1.2 SUBMITTALS

A. Maintenance Material Submittals:

1. Extra Stock Materials:
 - a. Include with system one spare parts kit 951-9011 and one PC interface cable 709-7144.

PART 2 - PRODUCTS**2.1 SYSTEM**

A. Manufacturer:

1. Category Four Approved Manufacturer. See Section 01 6200 for definitions of Categories.
 - a. Optex Inc, Chino, CA www.optexamerica.com.

B. Components:

1. TD-10U indoor / outdoor sensor transmitter.
2. RC-10U Chime Box with relay.

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 28 3101
FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install fire alarm and detection system as described in Contract Documents.
- B. Products Furnished But Not Installed Under This Section:
 - 1. Door Plates for door hold / release devices.
- C. Related Requirements:
 - 1. Division 21: Furnishing and installing of water flow switches, post indicating valves, valve tamper switches, and low air pressure switch.
 - 2. Section 23 0933: Furnishing and installing of duct smoke detectors in main return air ducts.
 - 3. Division 26: Quality of and installation standards for wiring, raceway, conduit, and boxes.

1.2 REFERENCES

- A. Reference Standards:
 - 1. National Fire Protection Association:
 - a. NFPA 72, 'National Fire Alarm and Signaling Code' (2019 or most recent edition adopted by AHJ).
 - 2. Underwriters Laboratories:
 - a. UL 268, 'Smoke Detectors for Fire Alarm Systems'.
 - b. UL 464, 'Audible Signal Appliances'.
 - c. UL 521, 'Heat Detectors for Fire Protective Signaling Systems'.
 - d. UL 864, 'Control Units and Accessories for Fire Alarm Systems'.
 - e. UL 1480, 'Speakers for Fire Alarm, Emergency, and Commercial and Professional'.
 - f. UL 1481, 'Power Supplies for Fire-Protective Signaling Systems'.
 - g. UL 1971, 'Standard for Signaling Devices for the Hearing Impaired'.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Prepared by authorized factory representative and including:
 - 1) Single line diagram of actual system. Typical riser diagrams are not acceptable.
 - 2) Complete wiring diagrams.
 - 3) Manufacturer's original catalog data and descriptive information on each piece of equipment to be used.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Certificate of completion, from Manufacturer's Representative, in accordance with NFPA 72 requirements.
 - 2. Qualification Statement:
 - a. Installer:
 - 1) Provide NICET Certification documentation.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Provide operating and maintenance instructions for each item of equipment submitted under Product Data.
 - 2) Provide instruction manual from Manufacturer that explains what is to be done in event of various indications.
 - b. Record Documentation:
 - 1) Include copy of approved shop drawings.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. System shall meet approval of authority having jurisdiction (AHJ). NEC and local ordinances and regulations shall govern unless more stringent requirements are specified.
 - 2. Equipment, devices, and cable shall be UL or Factory Mutual listed for use in fire alarm systems.
- B. Qualifications:
 - 1. Installer:
 - a. Project Forman or Person in Charge at all times to be NICET Level III Certified for work performed by this Section.
 - b. Provide Certificate documentation before installation.

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Manufacturers:
 - 1. Type One Acceptable Manufacturers:
 - a. Fire-Lite Alarms, Northford, CT www.firelite.com.
 - b. Silent Knight Security Systems, Northford CT www.silentknight.com.
 - c. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Performance:
 - 1. Design Criteria:
 - a. Automatic fire alarm system consisting of control panel, power supplies, alarm initiating devices, notification appliances, and off-site communicating devices. System shall be non-coded and addressable, and monitored for integrity of conductors.
 - b. Initiating device:
 - 1) Contractor verify existing system, Class A loop, or Class B.
 - 2) Addition devices will match existing system wiring.
 - c. Equipment and accessories furnished under this Specification shall be standard products of single manufacturer, or include written statement by Control Panel Manufacturer confirming compatibility of components and inclusion of these components under system warranty.
- C. Operation:
 - 1. Operation Sequences:
 - a. Operation of manual station or automatic activation of any smoke detector, heat detector, or sprinkler flow device shall:
 - 1) Cause system notification appliances to operate.
 - 2) Indicate zone in alarm on control panel.
 - 3) Initiate off-site alarm notification system.
 - b. System shall return to normal when operated device is returned to normal and control panel is manually reset, except alarms may be silenced as specified below.
 - c. Alarm may be silenced by switch in control panel.
 - 1) Ring Back Feature: When silenced, this shall not prevent the resounding of subsequent alarms if another zone should alarm.
 - d. When alarms are silenced, zone indicating red LEDs on control panel and remote annunciator shall remain indicated until operated device is returned to normal and control panel is manually reset.
 - e. Green pilot LED, or other visual annunciation, shall normally be on indicating that system is receiving normal power. In addition, failure of normal power shall be annunciated.
 - f. Trouble alarm and annunciation, operating together, shall signal trouble condition. Following conditions shall signal trouble condition:
 - 1) Failure of normal power.
 - 2) Opens or short circuits on indicating circuits.
 - 3) Disarrangements in system wiring.
 - 4) Control panel circuit board removal.
 - 5) Ground faults.
 - 6) Trouble silencing switch shall silence trouble alarm, but visual annunciation shall remain on until system is restored to normal. As ring-back feature, trouble alarm shall resound as reminder to return silencing switch to normal position.
 - g. Supervisory LED, separate from trouble LED, and alarm, operating together, shall signal operation of supervisory device, such as control valve tamper, low air pressure, and low temperature switches. Alarm silence switch shall operate in same manner as trouble alarm.
- D. Components:
 - 1. Control Panel:
 - a. Listed under UL Standard 864.
 - b. Solid-state design with flush or semi-flush mounting.
 - c. Control functions shall be behind locked door with annunciating devices visible through door. Single key shall operate all keyed functions in system. Provide three keys.
 - d. Each zone shall be electrically supervised in accordance with wiring style specified.
 - e. Provide integral surge protection.
 - f. Make provisions for connection to off-site alarm notification system including all required programming. Provide separate dry contacts for alarm and supervisory/trouble alarms.

- g. Power Supply:
 - 1) Provide indication of normal power supply.
 - 2) Loss of normal power shall activate trouble alarm.
 - 3) Meet requirements of and size in accordance with UL Standard 1481 and NFPA 72.
 - 4) Include standby batteries, charger, and automatic transfer equipment.
- h. Visual Annunciation:
 - 1) Separate indication on each zone for alarm, trouble, or supervisory conditions.
 - 2) Visual indication shall be by LED lights or other easily identifiable method.
 - 3) On zoned system, permanently custom label zones by zone name, not number.
 - 4) Fault or trouble condition on any zone shall not affect any other zone.
 - 5) Output level shall be adjustable at control panel.
 - 6) Alarm signal shall also operate strobe lights, if specified.
 - 7) Provide alarm silence switches at control panel.
 - 8) Trouble alarm shall be horn integral to control panel.
 - 9) Supervisory alarm may be same audible alarm as trouble alarm, but with separate visual annunciation.
- i. Audible Horn Alarm Annunciation:
 - 1) Provide separate and distinct alarm signals for alarm and trouble conditions.
 - 2) Alarm signal shall also operate strobe lights, if specified.
 - 3) Provide alarm silence switches at control panel.
 - 4) Trouble alarm shall be horn integral to control panel.
 - 5) Supervisory alarm may be same audible alarm as trouble alarm, but with separate visual annunciation.
- j. Output Devices:
 - 1) Provide dry contact relays as required to control external appliances such as door closers, fire/smoke dampers, and controlled exit devices. Contacts shall be normally open or closed as required by each device.
- 2. Off-Site Alarm Notification System:
 - a. Provide one (1) analog telephone lines to fire alarm control panel.
 - b. Install, program and connect cellular communication device furnished by Owner. Coordinate with Owner at least four (4) weeks in advance for equipment delivery.
 - c. Provide dialer system equipment and programming compatible with Owner selected monitoring service (refer to alarm.ldschurch.org for details).
 - d. Owner will arrange for monitoring connection contract.
 - e. Communicator device shall transmit all zone identification, device identification alarm identification, and all other signals available at panel to Owner's Central Station using standard contact ID codes.
 - f. Phone Dialer device shall be of same manufacturer as Fire Alarm Panel or shall be supplied, approved and tested by Fire Alarm Panel Manufacturer.
- 3. Alarm Initiating Devices:
 - a. Smoke Detectors:
 - 1) Photoelectric type.
 - 2) Listed under UL Standard 268.
 - 3) Provide visual indication of alarm on unit.
 - b. Duct Smoke Detectors:
 - 1) Furnished and Installed by Division 23.
 - 2) Power provided by Division 26.
 - 3) Connect to Fire Detection And Alarm System by this Section.
 - c. Heat Detectors:
 - 1) Non-settable 135 deg F fixed temperature.
 - 2) Provide visible indication that device has operated.
 - 3) Listed under UL Standard 521.
 - d. Low Building Temperature Device:
 - 1) Set for contact closure at 35 deg F.
 - 2) Type Two Acceptable Products;
 - a) Honeywell T631A1006.
 - b) Equal as approved by Architect before installation. See Section 01 6200.
 - e. Manual Fire Alarm Boxes:
 - 1) Non-coded and double-action requiring two actions to initiate alarm. Breakable glass type is not approved.

- 2) Box shall mechanically latch when actuated and require key to reset. Key shall match control panel door lock.
- 3) Provide STI-1200 clear polycarbonate covers.
4. Notification Appliances:
 - a. Color: White.
 - b. Strobe Only:
 - 1) Ceiling mount, semi-flush.
 - 2) Integrally mounted flashing light unit with block letters 'FIRE.' Adjustable light intensity of 15-110 candela and flash rate between one and three Hertz.
 - 3) Listed under UL Standard 1971.
 - c. Combination Horn / Strobe:
 - 1) Ceiling mount, semi-flush.
 - 2) Non-coded audible output of 90 dB minimum at 10 feet.
 - 3) Integrally mounted flashing light unit with block letters 'FIRE.' Minimum light intensity of 15 candela and flash rate between one and three Hertz.
 - 4) Listed under UL Standard 464 and UL Standard 1971.
5. Cables And Wiring:
 - a. Comply with NEC Article 760.
 - b. Jacket and insulation color shall be red.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fire alarm and detection systems as indicated, in accordance with Equipment Manufacturer's written instructions, and complying with applicable portions of NEC, NFPA, and NECA's 'Standard of Installation'.
 1. Mounting Heights:
 - a. Unless otherwise indicated, mount center of outlets or boxes at following heights above finish floor:
 - 1) Control Panel: 72 inches to top.
 - 2) Wall-Mounted Horn / Strobe: 80 inches 6 inches below ceiling, whenever ceiling is below 80 inches
 - 3) Wall-Mounted Strobe: 80 inches 6 inches below ceiling, whenever ceiling is below 80 inches.
 - 4) Manual pull stations: 48 inches.
 - 5) Remote annunciator panel: 60 inches.
 2. Locate fire alarm manual stations 24 inches minimum away from any light switch.
- B. Identification:
 1. Label zone indicators on control unit indicating location and type of initiating device, i.e., CORRIDOR SMOKE, VALVE TAMPER, AIR SYSTEM SMOKE, etc. Labels shall be engraved plastic laminate, or other permanent labeling system as supplied by Control Unit Manufacturer.
 2. Post copy of wire identification list inside fire alarm panel door or other area accessible to fire alarm service personnel.
 3. Print location of circuit disconnecting means inside panel.
 4. Place 11 inch by 8-1/2 inch color-coded zone diagram in plexiglass enclosure attached to wall adjacent to panel.
- C. Conductors:
 1. Fire alarm system conductors from different zones may be combined in common conduit. Make certain that raceway size and wire quantity, size, and type is suitable for equipment supplied and is within NEC standards. Label pull and junction boxes 'FIRE ALARM.'
 2. Install conductors and make connections to water flow switches, valve tamper switches, low air pressure switches, and duct smoke detectors.
 3. Loop wires through each device on zone for proper supervision. Tee-taps not permitted.
 4. Minimum conductor size shall be 14 AWG unless otherwise specified.
- D. Do not install ceiling mounted detectors within 36 inches of air discharge grilles. Do not install manual fire alarm boxes within 24 inches of light switches. Coordinate with other trades as required.

3.2 FIELD QUALITY CONTROL

- A. Field Tests:
 1. Provide factory-trained representative to perform complete system testing in presence of Owner's representative and local fire department personnel upon completion of installation.
 - a. Test each initiating and annunciating device for proper operation, except fixed temperature heat detectors.

- b. Test operation of trouble annunciation on each circuit.
- c. Perform complete testing of control panel functions including off-site monitoring.

3.3 CLOSEOUT ACTIVITIES**A. Instruction Of Owner:**

- 1. Instruct Owner's Representative in proper operation and maintenance procedures.

3.4 PROTECTION

- A. Provide dust protection for installed smoke detectors until finish work is completed and building is ready for occupancy.
- B. Protect conductors from cuts, abrasion and other damage during construction.

END OF SECTION

DIVISION 31: EARTHWORK

31 0500 COMMON WORK RESULTS FOR EARTHWORK

31 0501 COMMON EARTHWORK REQUIREMENTS

31 2000 EARTH MOVING

31 2316 EXCAVATION

31 2323 FILL

31 2329 AGGREGATE BASE

31 2333 FLOWABLE FILL

31 3000 EARTHWORK METHODS

31 3116 TERMITE CONTROL

END OF TABLE OF CONTENTS

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**SECTION 31 0501
COMMON EARTHWORK REQUIREMENTS**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited to:
 - 1. General procedures and requirements for earthwork.
- B. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
 - 2. Pre-Installation conferences held jointly with Section 31 0501 as described in Administrative Requirements on Part 1 of this specification section:

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in pre-installation conference for common earthwork sections:
 - a. Schedule conference after completion of site clearing but before beginning grading work.
 - b. Participate in pre-installation conference held jointly with following sections:
 - 1) Section 03 3111: 'Cast-In-Place Structural Concrete'.
 - 2) Section 31 2316: 'Excavation'.
 - 3) Section 31 2323: 'Fill'.
 - 4) Section 31 2329: 'Aggregate Base'.
 - c. In addition to agenda items specified in Section 01 3100, review following:
 - 1) Review common earthwork schedule.
 - 2) Review protection requirements.
 - 3) Review cleaning requirements.
 - 4) Review safety issues.
 - 5) Review field tests and inspections requirements.
- B. Sequencing:
 - 1. General Earthwork:
 - a. Excavation.
 - b. Fill.
 - c. Aggregate Base.

1.3 QUALITY ASSURANCE

- A. Testing And Inspection:
 - 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - a. Owner will employ testing agencies to perform testing and inspection 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'.

PART 2 - PRODUCTS: Not Used**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Verification Of Conditions:
 - 1. Forty eight (48) hours minimum before performing any work on site, contact Blue Stakes 'Utility Location Services' at: "811," -or- (800) 662-4111 to arrange for utility location services.
 - 2. Perform minor, investigative excavations to verify location of various existing underground facilities at sufficient locations to assure that no conflict with the proposed work exists and sufficient clearance is available to avoid damage to existing facilities.
 - 3. Perform investigative excavating ten (10) days minimum in advance of performing any excavation or underground work.
 - 4. Upon discovery of conflicts or problems with existing facilities, notify Architect by phone or fax within twenty four (24) hours. Follow telephone or fax notification with letter and diagrams indicating conflict or problem and sufficient measurements and details to evaluate problem.

3.2 PREPARATION

- A. Protection:
 - 1. Spillage:
 - a. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways.
 - b. Remove spillage and sweep, wash, or otherwise clean project, streets, and highways.

2. Dust Control:
 - a. Take precautions necessary to prevent dust nuisance, both on-site and adjacent to public and private properties.
 - b. Correct or repair damage caused by dust.

3.3 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
 1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform The Work or Contractors own Testing and Inspection services.
 2. Field Tests and Laboratory Tests:
 - a. Owner reserves right to require additional testing to re-affirm suitability of completed work including compacted soils that have been exposed to adverse weather conditions.
 3. Field Inspections:
 - a. Notify Architect forty eight (48) hours before performing excavation or fill work.
 - b. If weather, scheduling, or any other circumstance has interrupted work, notify Architect twenty four (24) hours minimum before intended resumption of grading or compacting.
- B. Non-Conforming Work:
 1. If specified protection precautions are not taken or corrections and repairs not made promptly, Owner may take such steps as may be deemed necessary and deduct costs of such from monies due to Contractor. Such action or lack of action on Owner's part does not relieve Contractor from responsibility for proper protection of The Work.

END OF SECTION

**SECTION 31 2316
EXCAVATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Perform excavating and trenching as described in Contract Documents, except as specified below.
 - 2. Procedure and quality for excavating and trenching performed on Project under other Sections unless specifically specified otherwise.
- B. Related Requirements:
 - 1. Section 31 0501: 'Common Earthwork Requirements' for:
 - a. General procedures and requirements for earthwork.
 - b. Pre-installation conference held jointly with other common earthwork related sections.
 - 2. Performance of excavating inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in pre-installation conference as specified in Section 31 0501:
 - 2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
 - a. Review protection of existing utilities requirements.

PART 2 - PRODUCTS: Not Used**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Verification Of Conditions:
 - 1. Carefully examine site and available information to determine type soil to be encountered.
 - 2. Discuss problems with Architect before proceeding with work.

3.2 PREPARATION

- A. Protection of Existing Utilities:
 - 1. Protect existing utilities identified in Contract Documents during excavation.
 - 2. If utilities not identified in Contract Documents are encountered, contact Architect before proceeding.

3.3 PERFORMANCE

- A. Use and Disposal of excavated onsite material.
 - 1. Existing onsite material processed to meet project requirements, or import material, may be used as engineered fill as shown on Construction Drawings.
 - 2. Excavated material not used for fill or not meeting requirements of import fill shall be wasted of site.
- B. Excavation:
 - 1. General:
 - a. Back cut excavations with bench stop ratios of 1.5 horizontal to 1 vertical, or flatter.
 - b. Excavation Carried Deeper Than Required:
 - 1) Under Footings: Fill with concrete specified for footings.
 - 2) Under Slabs: Use specified compacted backfill material.
 - c. Excavate as necessary for proper placement and forming of footings and foundations.
- C. Building Footings And Foundation Excavations:
 - 1. Excavate entire area under buildings, as described below:
 - a. Excavate down to a level depth at Elevation 94.00' (2 feet below bottom of footing).
- D. Site Excavations:
 - 1. General:
 - a. Excavate as necessary for proper placement and forming of concrete site elements and pavement structure. Remove vegetation and deleterious material and remove from site.
 - b. Backfill over-excavated areas with compacted base material specified in Section 31 2329.
 - c. Remove and replace exposed material that becomes soft or unstable.
 - 2. Utility Trenches:
 - a. Unless otherwise indicated, excavation shall be open cut. Short sections of trench may be tunneled if pipe or duct can be safely and properly installed and backfill can be properly tamped in tunnel sections and if approved by Architect.
 - b. Excavate to proper alignment, depth, and grade. Excavate to sufficient width to allow adequate space for proper installation and inspection of utility piping.
 - c. If trenches are excavated deeper than required, backfill until trench bottom is proper depth with properly compacted native material.
 - d. Pipe 4 Inches In Diameter Or Larger:
 - 1) Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its length.

- 2) Except where rock is encountered, take care not to excavate below depths indicated.
 - a) Where rock excavations are required, excavate rock with minimum over-depth of 4 inches below required trench depths.
 - b) Backfill over-depths in rock excavation and unauthorized over-depths with loose, granular, moist earth, thoroughly compacted.
- 3) Whenever wet or unstable soil incapable of properly supporting pipe, as determined by Architect, occurs in bottom of trench, remove soil to depth required and backfill trench to proper grade with coarse sand, fine gravel, or other suitable material acceptable to Architect.

3. If unusual excavating conditions are encountered, stop work and notify Architect.

3.4 REPAIR / RESTORATION

- A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

3.5 CLEANING

- A. Debris and material not necessary for Project are property of Contractor and are to be removed before completion of Project. However, if material necessary for Project is hauled away, replace with specified fill / backfill material.

END OF SECTION

SECTION 31 2323
FILL

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Perform Project backfilling and compacting as described in Contract Documents.
 - 2. Procedure and quality for backfilling and compacting performed on Project under other Sections unless specifically specified otherwise.
- B. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
 - 2. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - 3. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - 4. Section 01 4301: 'Quality Assurance – Qualifications' est. minimum qualification levels required.
 - 5. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 6. Section 01 7800: 'Closeout Submittals'.
 - 7. Section 31 0501: 'Common Earthwork Requirements' for:
 - a. General procedures and requirements for earthwork.
 - b. Pre-installation conference held jointly with other common earthwork related sections.
 - 8. Section 31 2333: 'Flowable Fill'.
 - 9. Performance of backfilling, compacting inside/outside of building required for electrical/mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 31 0501.
 - 2. In addition to agenda items specified in Section 01 3100, Section 31 0501, and Section 31 2333 if Flowable Fill is included, review following:
 - a. Review backfill requirements.
 - b. 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 requirements and frequency of testing and inspections.
- B. Sequencing:
 - 1. Do not backfill against dampproofing for twenty four (24) hours after application of dampproofing.
 - 2. Before backfilling, show utility and service lines being covered on record set of Drawings. Do not backfill until utilities involved have been tested and approved by Architect and until instructed by Architect.
- C. Scheduling:
 - 1. Notify Testing Agency and Architect seventy two (72) hours minimum before installation of fill / engineered fill to perform proctor and plasticity index tests on proposed fill or subgrade.
 - 2. Notify Testing Agency and Architect (24) hours before installation of fill to allow inspection.
 - 3. Allow special inspector to review all subgrades and excavations to determine if site has been prepared in accordance with geotechnical report prior to placing any fill (or concrete).
 - 4. Allow inspection and testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after inspections and test results for previously compacted work comply with requirements.

1.3 SUBMITTALS

- A. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Testing Agency Testing and Inspecting Reports of fill / engineered fill.

1.4 QUALITY ASSURANCE

- A. Testing and Inspection:
 - 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - 2. Owner will provide Testing and Inspection for fill / engineering fill:
 - a. Owner will employ testing agencies to perform testing and inspection for fill / engineering fill 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'.

1.5 DELIVERY, STORAGE, AND HANDLING**A. Delivery And Acceptance Requirements:**

1. Materials shall be delivered in original, unopened packages with labels intact.

1.6 FIELD CONDITIONS**A. Ambient Conditions:**

1. Do not perform work during unfavorable weather conditions:
 - a. Unacceptable conditions for installation include precipitation or the presence of any standing water or extreme temperatures.

PART 2 - PRODUCTS**2.1 MATERIALS****A. Site Material:**

1. Existing excavated on-site material is suitable for use as engineered fill and backfill after processing to meet Project requirements as explained below for Import Fill.
2. Existing excavated material shall be placed back into excavation, moisture-conditioned, and compacted.
 - a. Onsite material will be subject to testing and evaluation.
 - b. Expect loss of volume upon recompaction.

B. Imported Fill / Backfill:

1. Well graded non-expansive material conforming to ASTM D2487 free from debris, organic materials, deleterious materials, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.
 - a. Under Building Footprint And Paved Areas: 3-inch Minus engineered fill shall comply with soil classification group GM, and shall have liquid limit less than 30, plastic index less than 9, and fines between 10 and 30 percent passing the #200 sieve. Fill may not contain stones over 3 inches diameter, and 70 percent minimum of fill shall be smaller than 1-1/2 inch in any direction.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Material quantities are the responsibility of the contractor. Quantities will not be calculated and provided to the contractor.
- B. Export and import of material is required as necessary to meet placement described. There is no guarantee quantities will equal.
- C. On-Site material to be used as engineered fill shall be processed as described below:
 1. Material shall be screened and/or otherwise processed to meet the specification requirements of import engineered fill.
- D. Before placing fill, aggregate base, or finish work, prepare existing subgrade as follows:
 1. Do not place fill or aggregate base over frozen subgrade.
 2. Under Building Slab and Equipment Pad Areas:
 - a. Scarify subgrade 6 inches deep, moisture condition to uniform moisture content of between optimum and four (4) percent over optimum, and mechanically tamp 6 inches deep to ninety five (95) percent minimum of relative compaction.
 3. Under Driveways And Parking Areas:
 - a. Scarify subgrade 6 inches deep, moisture condition to uniform moisture content between optimum and four (4) percent over optimum, and mechanically tamp to ninety five (95) percent minimum of relative compaction.
 4. Under Miscellaneous Concrete Site Elements And Outside Face of Foundation Walls
 - a. Scarify subgrade 6 inches deep, moisture condition to uniform moisture content between optimum and four (4) percent over optimum, and mechanically tamp to ninety five (95) percent minimum of relative compaction.
 5. Moisture-condition all fill prior to placement and to within 2 percent of optimum moisture content.

3.2 PERFORMANCE**A. Interface With Other Work:**

1. Section 31 2318: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
2. Section 31 2325: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
3. Section 31 2333: 'Flowable Fill' for backfilling of piping systems and other utilities under paving'.

B. Structural Fill Placement:

1. General:
 - a. Maximum lift thickness shall be 8 inches after compaction.

2. Under Building Within Excavated Areas:
 - a. General Sequence of materials to be installed:
 - 1) Engineered Fill.
 - 2) Vapor Barrier.
 - 3) Consolidated Gravel Aggregate Base.
 - b. Install engineered fill from (elevation 94.00), and up to 8 inches below finished elevation of concrete slab (99.33).
- C. Fill / Backfill:
 1. General:
 - a. Around Buildings And Structures: Slope grade away from building as specified in Section 31 2325. Hand backfill when close to building or where damage to building might result.
 - b. Site Utilities:
 - 1) Under Pavement and Concrete Site Elements: Extend excavatable flowable fill / backfill to elevation of subgrade. Do not place aggregate base material until excavatable flowable fill / backfill has cured seventy two (72) hours.
 - c. Do not use puddling or jetting to consolidate fill areas.
 2. Compacting:
 - a. Fill / Backfill And Aggregate Base:
 - 1) All fill material shall be well-graded granular material with maximum size less than 3 inch and with not more than fifteen (15) percent passing No. 200 sieve.
 - 2) Under Building Slab and Equipment Pad Areas:
 - a) Place in 8 inch maximum layers, moisture condition to plus or minus two (2) percent of optimum moisture content, and mechanically tamp to ninety five (95) percent minimum of maximum laboratory density as established by ASTM D1557.
 - 3) Under Miscellaneous Concrete Site Elements And Outside Face of Foundation Walls:
 - a) Place in 8 inch maximum layers, dampen but do not soak, and mechanically tamp to ninety five (95) percent minimum of maximum laboratory density as established by ASTM D1557.
 - 4) Utility Trenches:
 - a) Site:
 - (1) Place fill in 12 inch layers and moisture condition to plus or minus two (2) percent of optimum moisture content.
 - (2) Compact fill to ninety five (95) percent minimum relative compaction to within 12 inches of finish grade.
 - (3) Compact fill above 12 inches to eighty five (85) percent relative compaction.
 - b) Under Slabs:
 - (1) Under Slabs: Place fill in 6 inch layers, moisture condition to plus or minus two (2) percent of optimum moisture content, and compact to ninety five (95) percent minimum relative compaction to within 4 inches of finish grade.
 - (2) Final 4 inches of fill shall be aggregate base as specified in Section 31 2329.
 - 5) Fill Slopes: Compact by rolling or using sheepsfoot roller.
 - 6) Backfill Under Footings: Not allowed.
 - 7) Other Backfills: Place other fills in 12 inch layers and compact to ninety five (95) percent relative compaction.
 - 8) Loose material from compacted subgrade surface shall be immediately removed before placing compacted fill or aggregate base course.

3.3 REPAIR / RESTORATION

- A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

3.4 FIELD QUALITY CONTROL

- A. Field Tests and Inspections:
 1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor:
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
 - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
 2. Fill / Engineered Fill:
 - a. Testing Agency shall provide testing and inspection for fill.
 - b. Number of tests may vary at discretion of Architect.

- c. Testing Agency is to provide one (1) moisture-maximum density relationship test for each type of fill material.
- d. Prior to placement of engineered fill, inspector shall determine that site has been prepared in accordance with geotechnical report.
- e. Footing subgrade: At footing subgrades Certified Inspector is to verify that soils conform to geotechnical report.
- f. Testing Agency will test compaction of soils according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Lift thicknesses shall comply with geotechnical report. Inspector shall determine that in-place dry density of engineered fill material complies with geotechnical report. Tests will be performed at following locations and frequencies:
 - 1) Paved Areas: At each compacted fill and backfill layer, at least one (1) test for every 10,000 sq. ft. or less of paved area but in no case less than three (3) tests.
 - 2) Building Slab Areas: At each compacted fill and backfill layer, at least one test for every 2,500 sq. ft. or less of building slab area but in no case less than three (3) tests.
 - 3) Foundation Wall/Continuous Footing Backfill: At each compacted backfill layer, at least one (1) test for each 40 linear feet or less of wall length, but no fewer than two (2) tests.
 - 4) Trench Backfill: At each 12 inch compacted lift for each 100 linear feet or less of trench length but no fewer than two (2) tests.
 - 5) Sidewalks, Curbs, Gutters, Exterior Pads: Minimum of one (1) test for each lift for each 40 lineal feet or one (1) test for every 5,000 sq. ft. or less of pad area but no fewer than three (3) tests.
- g. Required verification and inspection of soils as referenced in 2015 IBC Table 1704.7 'Required Verification And Inspection Of Soils'. Periodic and continuous inspections include:
 - 1) Verify materials below footings are adequate to achieve design bearing capacity (periodic).
 - 2) Verify excavations are extended to proper depth and have reached proper material (periodic).
 - 3) Perform classification and testing of compacted fill materials (periodic).
 - 4) Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill (continuous).
 - 5) Prior to placement of compacted fill, observe subgrade and verify that site has been prepared properly (periodic).

3.5 CLEANING

- A. Debris and material not necessary for Project are property of Contractor and are to be removed before completion of Project. However, if material necessary for Project is hauled away, replace with specified fill / backfill material.

END OF SECTION

**SECTION 31 2329
AGGREGATE BASE**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install the following as described in Contract Documents:
 - a. Aggregate Base:
 - 1) Interior slabs-on-grade Concrete.
 - 2) Miscellaneous exterior concrete (including equipment pads).
- B. Products Installed But Not Furnished Under This Section:
 - 1. Vapor Retarder:
 - a. Interior slabs on grade:
 - 1) Under-slab vapor retarder and seam tape.
- C. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
 - 2. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - 3. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - 4. Section 01 4301: 'Quality Assurance- Qualifications' est minimum qualification levels required.
 - 5. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 6. Section 01 6200: 'Product Options' for requirements for product options.
 - 7. Section 01 7800: 'Closeout Submittals'.
 - 8. Section 03 3111: 'Cast-In-Place Structural Concrete'.
 - 9. Section 07 2616: 'Below-Grade Vapor Retarders' for:
 - a. Furnishing of vapor retarder and seam tape.
 - 10. Section 31 0501: 'Common Earthwork Requirements':
 - a. General procedures and requirements for earthwork.
 - b. Pre-installation conference held jointly with other common earthwork related sections.
 - 11. Section 31 2323: 'Fill' for compaction procedures and tolerances.
 - 12. Section 31 3116: 'Termite Control'.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 31 0501.
 - 2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
 - a. Review requirements and frequency of testing and inspections.
 - b. Review termite control application requirements.
 - c. Review aggregate base installation requirements.
 - d. Review vapor retarder installation requirements.
 - e. Review proposed miscellaneous exterior concrete schedule.
 - f. 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. Sequencing:
 - 1. Termite Control:
 - a. Termite application as described in Section 31 3116 'Termite Control':
 - 1) Apply termite protection on top of soil base before aggregate base is installed.
 - 2. Vapor Retarder:
 - a. Install below-grade vapor retarder on top of soil base and under aggregate base.
 - 3. Aggregate Base:
 - a. Install aggregate base at location shown in Contract Drawings.
 - 4. Concrete Slab is installed.
- C. Scheduling:
 - 1. Interior slab-on-grade concrete:
 - a. Notify Architect twenty four (24) hours minimum before installation of aggregate base to allow inspection of vapor retarder installation.
 - b. Notify Testing Agency and Architect twenty four (24) hours minimum before installation of interior concrete slabs to allow inspection of aggregate base.
 - c. Allow inspector to review all sub grades and excavations to determine if building pad has been prepared in accordance with Contract Documents prior to placing any aggregate base.

2. Miscellaneous exterior concrete:
 - a. Notify Testing Agency and Architect twenty four (24) hours minimum before placing concrete for exterior site work concrete (sidewalks, curbs, gutters, etc.), footings, foundation walls, and building slabs to allow inspection of aggregate base.

1.3 SUBMITTALS

- A. Informational Submittals:
 1. Gradation Report / Sieve Analysis for all proposed base materials.
 2. Copy of UDOT Specification Requirements for Aggregate Base.
- B. Closeout Submittals:
 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Testing and Inspection Reports:
 - 1) Testing Agency Testing and Inspecting Reports of aggregate base.

1.4 QUALITY ASSURANCE

- A. Testing And Inspection:
 1. Owner will provide Testing and Inspection for aggregate base:
 - a. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - b. Owner will employ testing agencies to perform testing and inspection for aggregate base 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'.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 FIELD CONDITIONS

- A. Ambient Conditions:
 1. Do not perform work during unfavorable conditions as specified below:
 - a. Aggregate Base:
 - 1) Presence of free surface water.
 - 2) Over-saturated sub base materials.
 - b. Vapor Retarder:
 - 1) Do not install during high winds which would tear or damage vapor retarder.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aggregate Base at Interior Slab-On-Grade Concrete (Section 03 3111):
 1. Gravel shall be well-graded, clean, crushed rock, import material:
 - a. Size:
 - 1) 3/4 inch minimum to one inch maximum.
 - b. Fractured Faces:
 - 1) Gravel shall have Fractured faces as follows:
 - a) Fractured on one face: 100 percent.
 - b) Fractured on two faces: 50 percent.
- B. Exterior Concrete (Section 03 3111 'Cast-In-Place Structural Concrete'):
 1. New Aggregate Base:
 - a. Road Base to conform to State DOT Specifications.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Stockpiles:
 1. Provide area for each stockpile of adequate size, reasonably uniform in cross-section, well drained, and cleared of foreign materials.
 2. Locate piles so that there is no contamination by foreign material and no intermingling of aggregates from adjacent piles. Do not use steel-tracked equipment on stockpiles.
 3. Do not store aggregates from different sources, geological classifications, or of different gradings in stockpiles near each other unless bulkhead is placed between different materials.
 4. Do not use washed aggregates sooner than twenty four (24) hours after washing or until surplus water has drained out and material has uniform moisture content.
 5. Do not stockpile higher than 15 feet. Cover or otherwise protect stockpiles for use in HMA to prevent buildup of moisture.

- B. Surface Preparation (Miscellaneous Exterior Concrete):
 - 1. Subgrade:
 - a. Finish grade to grades required by Contract Documents.
 - b. Compact subgrade as specified in Section 31 2323.
- C. Surface Preparation (Interior Slab-On-Grade Concrete):
 - 1. Vapor Retarder:
 - a. Install vapor retarder in accordance with ASTM E1643 except where Contract Documents indicate otherwise and following instructions:
 - 1) Install vapor retarder over compacted soil subgrade and under aggregate base over so entire area under slab is covered.
 - 2) Install vapor retarder in accordance with ASTM E1643 at interior stem walls.
 - 3) Lap joints 6 inches minimum and seal with specified seam tape.
 - 4) Seal vapor retarder around pipes, conduits, and other utility items that penetrate vapor retarder using factory-fabricated boot installed as recommended by Manufacturer.
 - 5) Seal tears and punctures.

3.2 INSTALLATION

- A. Aggregate Base:
 - 1. General:
 - a. Do not place aggregate base material when subgrade is frozen or unstable.
 - b. Spread aggregate base material with equipment except in limited or restricted areas where use of hand spreading is allowed.
 - c. Spread aggregate base material in manner that does not break down material and eliminates segregation, ruts, and ridges.
 - d. Correct damage to aggregate base caused by construction activities, and maintain corrected aggregate base until subsequent course is placed.
 - e. Do not allow traffic on aggregate base.
 - f. Remove all standing storm water.
 - 2. Interior concrete slab-on-grade aggregate base:
 - a. Place 4 inches minimum of aggregate base over vapor retarder, level, and compact with vibratory plate compactor.
 - 3. Miscellaneous exterior concrete aggregate base:
 - a. Except under mow strips, place 4 inches minimum of aggregate base, level, and compact as specified in Section 31 2323.

3.3 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
 - 1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor.
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
 - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
 - 2. Aggregate Base:
 - a. Interior slab-on-grade concrete areas:
 - 1) Testing Agency shall provide testing and inspection for interior aggregate base.
 - 2) Number of tests may vary at discretion of Architect.
 - 3) Testing Agency will test compaction of base in place according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Tests will be performed at following frequency:
 - a) Building Slab Areas: One test for every 2,500 sq. ft. or less of building slab area but no fewer than three tests.
 - b. Miscellaneous exterior concrete areas:
 - 1) Testing Agency shall provide testing and inspection for exterior aggregate base.
 - 2) Number of tests may vary at discretion of Architect.
 - 3) Testing Agency will test compaction of base in place according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Tests will be performed at following frequency:
 - a) Sitework Areas: One test for every 10,000 sq. ft. or less of exterior pads area but no fewer than three tests.

3.4 PROTECTION**A. Interior Slab-On-Grade Concrete:****1. Vapor Retarder:**

- a. Do not allow water onto vapor retarder or aggregate base before placing concrete.
- b. Protect membrane from possible punctures caused by reinforcing bar supports before placing concrete.

END OF SECTION

**SECTION 31 2333
FLOWABLE FILL****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install cement stabilized sand as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - 2. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - 3. Section 01 4301: 'Quality Assurance – Qualifications' est. minimum qualification levels required.
 - 4. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 5. Section 01 7800: 'Closeout Submittals'.
 - 6. Section 31 0501: 'Common Earthwork Requirements' for:
 - a. General procedures and requirements for earthwork.
 - 7. Performance of backfilling/compacting inside/outside building required for electrical/mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference in conjunction with Section 31 2323.
 - 2. In addition to agenda items specified in Section 01 3100, Section 31 2323, and Section 31 0501, review following:
 - a. Review backfill requirements.

1.3 SUBMITTALS

- A. Informational Submittals:
 - 1. Design Data:
 - a. Submit mix designs to meet following requirements:
 - 1) Excavatable Fill (Flowable/Controlled Low Strength Materials CLSM):
 - a) Provide mix designs for review.
 - 2. Design Data:
 - a. Submit mix designs to meet following requirements:
 - 1) Excavatable Fill (Flowable/Controlled Low Strength Materials CLSM):
 - a) Provide target cement content and production data for sand-cement mixture in accordance with requirements as specified in Part 2 of this specification.
 - 2) Cement Stabilized Sand:
 - a) Base design on strength specimens molded in accordance with ASTM D558 at moisture content within 3 percent of optimum and within four (4) hours of batching.
 - (1) Design will be based on strength specimens molded in accordance with ASTM D558 at moisture content within three (3) percent of optimum and four (4) hours of batching.
 - (2) Determine minimum cement content from production data and statistical history. Provide no less than 1.1 sacks of cement per ton of dry sand.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
 - 1. Dosage capsules have storage tolerance in temperature range of 0 deg F to 55 deg F

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Cement Stabilized Sand:
 - 1. Cement: Type I Portland cement conforming to ASTM C150/C150M.
 - 2. Sand:
 - a. Clean, durable sand meeting grading requirements for fine aggregates of ASTM C33/C33M, and the following requirements:
 - 1) Classified as SW, SP, SW-SM, SP-SM, or SM by Unified Soil Classification System of ASTM D2487.
 - 2) Maximum compressive strength of 125 psi maximum at 28 days.
 - 3) Minimum compressive strength of 65 psi maximum at 28 days.
 - 4) Deleterious Materials:
 - a) Clay lumps, ASTM C142/C142M less than 0.5 percent.
 - b) Lightweight pieces, ASTM C123/C123M less than 5 percent.

- c) Organic impurities, ASTM C40/C40M color no darker than standard color.
 - 5) Plasticity index of 4 or less when tested in accordance with ASTM D4318.
- 3. Water: Potable water, free of oils, acids, alkalies, organic matter or other deleterious substances, meeting requirements of ASTM C94/C94M.
- B. Excavatable Flowable Fill /Controlled Low Strength Materials CLSM:
 - 1. Excavatable application:
 - 2. Follow recommendations of ACI 229R.
 - 3. Contain maximum of 50 lbs. to 100 lbs. of cement per yard of flowable fill / backfill
 - 4. Air content:
 - a. General:
 - 1) Stable air content of fifteen (15) to thirty five (35) percent.
 - b. Darafill:
 - 1) Stable air content of twenty (20) percent, Darafill dosage as necessary.
 - 5. Fly ash:
 - a. Fly ash between 0 to 900 lbs. per cu. yd.
 - b. When using less than 75 lbs. per cu. yd. of Portland cement, combined quantity of Portland cement and fly ash must be at least 100 lbs. per cu. yd.
 - 6. Water content:
 - a. Select water content as necessary to produce consistency that will result in flowable, self-leveling product at time of placement.
 - b. Maximum water content of 36 gallons per yard of backfill.
 - 7. Slump: 7 inch minimum.
 - 8. Type Two Acceptable Products:
 - a. Darafill by W R Grace & Co, Cambridge, MA www.na.graceconstruction.com.
 - b. Equal as approved by Architect before use. See Section 01 6200.

2.2 MIXING MATERIALS

- A. Cement Stabilized Sand:
 - 1. Add required amount of water and mix thoroughly in pug mill-type mixer.
 - 2. Stamp loading time on batch ticket. Reject material not placed/compacted within (4) hours after.

2.3 MIXING QUALIFICATION

- A. Cement Stabilized Sand:
 - 1. Determine target cement content of material as follows:
 - a. Obtain samples of sand-cement mixtures at production facility representing range of cement content consisting of at least three (3) points.
 - b. Complete molding of samples within four (4) hours after addition of water.
 - c. Perform strength tests (avg of (2) specimens) at forty eight (48) hours and seventy (7) days.
 - d. Perform cement content tests on each sample.
 - e. Perform moisture content tests on each sample.
 - f. Plot average forty eight (48) hour strength vs. cement content.
 - g. Record scale calibration date, sample date, sample time, molding time, cement feed dial settings, and silo pressure (if applicable).
 - 2. Test raw sand for following properties at point of entry into pug-mill:
 - a. Gradation.
 - b. Plasticity index.
 - c. Organic impurities.
 - d. Clay lumps and friable particles.
 - e. Lightweight pieces.
 - f. Moisture content.
 - g. Classification.
 - 3. Present data obtained in format similar to that provided in sample data form attached to this Section.
 - 4. Target content may be adjusted when statistical history so indicates. For determination of minimum product performance use formula:
 - a. $f c\% \frac{1}{2} \text{ standard deviation.}$

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Interface With Other Work:
 - 1. Section 31 2323: 'Fill'.
- B. Fill / Backfill:

- a. Site Utilities:
 - 1) In Landscape Areas: Use backfill consisting of on-site soil.
 - 2) Under Pavement and Concrete Site Elements: Extend excavatable flowable fill / backfill to elevation of subgrade. Do not place aggregate base material until excavatable flowable fill / backfill has cured seventy two (72) hours.
- b. Do not use puddling or jetting to consolidate fill areas.

3.2 PLACING

A. Cement Stabilized Sand:

1. Place sand-cement mixture in maximum 12 inch thick loose lifts and compact to ninety five (95) percent of maximum density as determined in accordance with ASTM D558, unless otherwise specified:
 - a. Refer to related specifications for thickness of lifts in other applications.
 - b. Target moisture content during compaction is +3 percent of optimum.
 - c. Perform and complete compaction of sand-cement mixture within four (4) hours after addition of water to mix at plant.
2. Do not place or compact sand-cement mixture in standing or free of water.

3.3 FIELD QUALITY CONTROL

A. Testing:

1. Testing will be performed under provisions of Section 01 4523 'Testing Laboratory Services':
 - a. One (1) sample of cement stabilized sand shall be obtained for each 150 tons of material placed per day with no less than one (1) sample per day of production.
 - b. Random samples of delivered cement stabilized sand shall be taken in field at point of delivery in accordance with ASTM D3665.
 - c. Obtain three (3) individual samples of approximately 12 lbs. to 15 lbs. each from first, middle, and last truck and composite them into one (1) sample for testing purposes.
2. Prepare and mold four (4) specimens (for each sample obtained) in accordance with ASTM D558, Method A, without adjusting moisture content. Samples will be molded at approximately same time material is being used, but no later than four (4) hours after water is added to mix.
3. After molding, specimens will be removed from molds and cured in accordance with ASTM D1632.
4. Specimens will be tested for compressive strength in accordance with ASTM D1633, Method A. Two (2) specimens will be tested at forty eight (48) hours, plus or minus two (2) hours and two (2) specimens will be tested at seven (7) days, plus or minus four (4) hours.
5. Strength test will be average of strengths of two (2) specimens molded from same sample of material and tested at same age. Average daily strength will be average of strengths of all specimens molded during one (1) day's production and tested at same age.
6. Precision and Bias: Test results shall meet recommended guideline for precision in ASTM D1633 Section 9.
7. Reporting: Test reports shall contain, as a minimum, following information:
 - a. Supplier and plant number.
 - b. Time material was batched.
 - c. Time material was sampled.
 - d. Specification section number.
 - e. Indication of compliance / non-compliance.
 - f. Mixture identification.
 - g. Required strength.
 - h. Compressive strength data as required by ASTM D1633.
 - i. Supplier mixture identification.
 - j. Specimen diameter and height, in..
 - k. Specimen cross-sectional area, sq.in

3.4 ACCEPTANCE

A. Strength level of material will be considered satisfactory if:

1. Maximum compressive strength of 125 psi maximum at twenty eight (28) days.
2. Minimum compressive strength of 65 psi maximum at twenty eight (28) days.

B. Testing laboratory shall notify Architect/Engineer of tests indicating results falling below specified strength requirements within twenty four (24) hours.

C. If any strength test of laboratory cured specimens falls below the specified strength, Contractor may, at his own expense, request test of cores drilled from the area in question in accordance with ASTM

C42/C42M. In such cases, three (3) cores shall be taken for each strength test that falls below values given in paragraph A above.

- D. Cement stabilized sand in an area represented by core tests shall be considered satisfactory if the average of three (3) cores is equal to at least 100 psi and if no single core is less than 70 psi. Additional testing of cores extracted from locations represented by erratic core strength results will be permitted.

END OF SECTION

**SECTION 31 3116
TERMITE CONTROL**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install complete soils treatment with termiticide under and adjacent to building to provide uniform toxic barrier continuous treated zone in all routes of termite entry.
- B. Related Requirements:
 - 1. Section 31: Earthwork.
 - a. Section 31 0501: 'Common Earthwork Requirements'.
 - b. Section 31 2329: 'Aggregate Base':
 - 1) Installation of below-grade vapor retarder.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate soil treatment application with excavation, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.
 - 2. Interior slab-on-grade concrete:
 - a. Coordinate work so vapor retarder can be installed as soon as possible after application of termite protection on top of soil base or aggregate base.
- B. Pre-Installation Conference:
 - 1. Participate in mandatory pre-installation conference.
 - 2. Schedule pre-installation conference for new Projects after completion of Fine Grading specified in Section 31 2325, but before beginning Aggregate Base as specified in Section 31 2329. This conference may be held jointly with pre-installation conference for Common Planting Requirements specified in Section 32 9001.
 - 3. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review Applicator Qualification requirements.
 - b. Review Ambient Conditions for acceptability for application of termiticide products.
 - c. Review Delivery, Storage, and Handling requirements.
 - d. Review Examination, Preparation, and Application requirements as called out in Part 3 Execution.
 - e. Review Field Quality Control and Protection requirements as called out in Part 3 Execution.
- C. Sequencing:
 - 1. Application OPTION A:
 - a. Apply termite protection on top of soil base before aggregate base and vapor retarder is installed.
 - 2. Application OPTION B:
 - a. Install vapor retarder after application of termite protection on top of aggregate base.
 - b. Increase application rate for volume as per Manufacturer's instruction.
 - c. Install below-grade vapor retarder on top of soil base or aggregate base.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Submit Chemical Manufacturer's printed literature regarding chemical composition, concentration, and rates and method of application.
 - b. Submit MSDS information.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Provide certificates required by any authorities having jurisdiction (AHJ).
 - 2. Design Data Submittals:
 - a. Certified Applicator's statement indicating total amount of chemical required for Project to provide required amount of mix solution at specified concentration and application rates.
 - b. Certified Applicator to submit take-off showing amounts of square foot and lineal foot application at specified application rate. Also indicate total amount of mix solution required for Project.
 - 3. Manufacturers' Instructions:
 - a. Manufacturer's printed label on product regarding chemical composition, concentration, and rates and method of application.

4. Qualification Submittals:
 - a. Provide BASF Partner Number and evidence of license from authorities having jurisdiction (AHJ).
- 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.
 - b. Record Documentation:
 - 1) Soil Treatment Application Report: After application of termiticide is complete, submit report including the following:
 - a) Date and time of application.
 - b) Moisture content of soil before application.
 - c) Termiticide brand name and batch number of concentrate.
 - d) Mix rate and quantity of diluted termiticide used.
 - e) Areas of application.
 - f) Weather at time of application.
 - g) Water source for application.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 1. Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.
- B. Qualifications:
 1. Applicator: Requirements of Section 01 4301 applies but not limited to the following:
 - a. Applicator shall be licensed pest professional according to regulations of authorities having jurisdiction (AHJ) with Manufacturer's Certification training in correct application methods to apply termite control treatment and products in jurisdiction where Project is located.
 - b. Applicator should be familiar with trenching, rodding, short rodding, subslab injection, low-pressure banded surface applications, and foam delivery techniques.
- C. Source Limitations:
 1. Obtain termite control products from single source from single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery, Storage, and Handling:
 1. Certified Applicator responsible for delivery, storage, handling, and dispose of specified products of this section.
- B. Storage And Handling Requirements:
 1. Storage:
 - a. Keep containers closed when not in use.
 - b. Store unused product in original container only, out of reach of children and animals.
 - c. Do not store near food or feed.
 - d. Protect from freezing.
 2. Spills or leaks:
 - a. General:
 - 1) In case of spill or leak on floor or paved surfaces, soak up with sand, earth, or synthetic absorbent.
 - 2) Avoid skin contact.
 - 3) Remove residue to chemical waste area.
 - 4) Ensure adequate decontamination of tools and equipment following cleanup.
 - b. All leaks resulting in application of this product in locations other than those prescribed must be cleaned up prior to leaving application site.
 - 1) DO NOT allow people or pets to contact contaminated areas until cleanup is completed.
- C. Packaging Waste Management:
 1. Disposal:
 - a. Dispose of empty containers in accordance with Manufacturer's and regulatory agency's requirements.
 - b. Do not contaminate water, food, or feed by storage or disposal.

1.6 FIELD CONDITIONS

- A. Ambient Conditions
 1. Comply with EPA-Registered Label and requirements of authorities having jurisdiction (AHJ) and Manufacturer's written recommendations regarding environmental conditions under which termiticide shall be applied.

B. Environmental Limitations:

1. To ensure penetration, do not treat soil that is water saturated or frozen.
2. Do not treat soil (or aggregate base) while precipitation is occurring or movement from treatment area (site) is likely to occur.
3. Do not treat soil (or aggregate base) while large precipitation is expected to occurring within two to four (2-4) hours after application.

1.7 WARRANTY**A. Manufacturer Warranty:**

1. Provide Manufacturer's written warranty:
 - a. Warranty shall guarantee effectiveness of treatment against subterranean termite infestation for five (5) years minimum from acceptance date of Project and be signed by applicator and Contractor as co-guarantors.
 - b. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

PART 2 - PRODUCTS**2.1 MATERIALS****A. Termiticide:**

1. Description:
 - a. Provide EPA-Registered termiticide, complying with requirements of authorities having jurisdiction (AHJ), in aqueous solution formulated to prevent termite infestation.
 - b. Provide quantity required for application at label volume and rate for maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.
2. Design Criteria:
 - a. Undetectable:
 - 1) Non-repellent or undetectable chemical technology.
 - b. Transfer Effect:
 - 1) Slow-acting treatment allowing individual termite's ample time to transfer treatment to other termites as they come in contact within the colony.
 - c. Service Life of Treatment:
 - 1) Soil treatment termiticide that is effective for not less than five (5) years against infestation of subterranean termites.
3. Mixes:
 - a. Mix chemicals and water at Manufacturer's recommended printed requirements.
 - 1) To provide maximum control and protection against termite infestation, apply as per Manufacturer printed instructions including but not limited to the following:
 - a) To maximize termiticide potency, product should be applied in manner to provide continuous treated zone to prevent termites from infesting wood to be protected.
 - b) Product is labeled for use at 0.06 percent, 0.09 percent or 0.125 percent finished dilution. The 0.06 percent finished dilution should be used for typical control situations. Where severe termite infestations, problem soils, or difficult construction types are encountered, it may be advisable to use either 0.09 percent or 0.125 percent.
4. Category Four Approved Product. See Section 01 6200 for definitions of Categories. (No substitution of specified product or alteration of Manufacturer's application requirements is allowed):
 - a. Termidor by BASF Professional Pest Control, Research Triangle Park, NC
www.termidorhome.com, or www.pestcontrol.basf.us.

PART 3 - EXECUTION**3.1 EXAMINATION****A. Evaluation And Assessment:**

1. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.
2. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION**A. Protection Of In-Place Conditions:**

1. Allow no disturbance of treated soil (aggregate base) between application of solution and placing of concrete. (Disturbed defined as removing fill and/or replacing fill).

2. Protect neighboring property, water sources, and personnel on site from contamination.
 - a. Use anti-backflow equipment or procedures.
 - b. Do not treat soil beneath structures that contain wells or cisterns.
 - c. Take extreme care to avoid runoff. Do not treat soil that is water-saturated or frozen.
 3. Maintain, on job site, empirical name of chemical, Manufacturer's precautions, and phone numbers of proper authorities to notify in case of spillage or other accident.
- B. General Preparation:
1. Comply with the most stringent requirements of authorities having jurisdiction (AHJ) and with Manufacturer's written instructions for preparation before beginning application of termite control treatment.
 2. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, trash, and construction waste wood from soil within and around foundations.
 3. Do not apply application of termite control until location of air ducts, vents, water, and sewer lines are known and identified. Take extreme caution to avoid contamination of these structural elements and airways.
- C. Soil Treatment Preparation:
1. Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated.
 2. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings.
 3. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
 4. Fit filling hose connected to water source at site with backflow preventer, complying with requirements of authorities having jurisdiction (AHJ).

3.3 APPLICATION

- A. Interface With Other Work:
1. Interior slab-on-grade concrete:
 - a. Installation of vapor retarder, geomembrane if used, and aggregate base.
- B. General:
1. Comply with the most stringent requirements of authorities having jurisdiction (AHJ) and with Manufacturer's EPA-Registered Label for products.
 - a. Application Restrictions:
 - 1) Do not apply while precipitation is occurring or large precipitation is expected to occurring within two to four (2-4) hours after application'.
 - 2) Do not contaminate water, food or feed. Cover or remove all exposed food, feed and drinking water.
 - 3) Do not apply with 15 feet of bodies of fresh water lakes, reservoirs, rivers, permanent streams, marshes, and natural ponds.
 - 4) Do not allow residents, children, other persons or pets into immediate area during application.
 - 5) Do not allow residents, children, other persons or pets into treated area until sprays have dried. After application, applicator is required to check for leaks resulting in deposition of treatment dilution in locations other than those prescribed.
 2. Application OPTION B as specified in Sequencing of this specification in Part 1 General:
 - a. Increase application rate for volume as per Manufacturer's instruction.
- C. Applying Soil Treatment:
1. Mix treatment termiticide solution to a uniform consistency.
 2. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
 3. If impervious soils make reduction in volume of solution necessary, increase percentage of toxicant used in proportion to insure same amount of insecticide be used per linear or square foot.
 4. Apply overall treatment to entire surface to be covered by concrete slab.
- D. Pre-Construction Treatment:
1. For Slab-on-Grade Construction:
 - a. 4 gallons per 10 linear ft along outside of exterior foundation.
 - b. 2 gallons per 10 linear ft in voids of unit masonry foundation walls or piers.

- c. One gallon per 10 sq ft as overall treatment under slab and attached porches.
- d. 4 gallons per 10 linear ft along inside of exterior foundation walls, both sides of interior partition foundation walls, and around utility services and other features that will penetrate slab or where there will be break in concrete (grade changes, zip strips, cold joints, etc).

3.4 RE-APPLICATION

- A. Reapply treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.5 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. Applicator:
 - a. Substitution of specified product or alteration of Manufacturer's application requirements is considered defective or not complying with Contract Document requirements. Correct such work at no cost to the Owner.

3.6 PROTECTION

- A. Allow sufficient time (12 hours minimum) for drying after application before resuming construction activities.
- B. Keep off treated areas until completely dry. Do not allow workers or other personnel to enter treatment area until chemical has been absorbed into soil.
- C. Protect application areas from precipitation as recommended by Manufacturer.
- D. Protect temiticide solution, dispersed in treated soils and fill, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- E. Post signs in areas of application warning of poison application. Remove signs when areas with application are covered by other construction.

END OF SECTION

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