

project manual

THE CHURCH OF
JESUS CHRIST
OF LATTER-DAY SAINTS

Alpine View, Juniper Crest, Patriot Ridge

Herriman UT Blackridge Stake

4617 West Patriot Ridge Drive, Herriman, Utah

Project Number: 5000084-22020201



bradley gygi architect & associates, pllc

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Professional Consultants



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BIDDING REQUIREMENTS

FOR SMALL PROJECTS (U.S.)

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INVITATION TO BID (U.S.)

1. CONTRACTORS INVITED TO BID THE PROJECT:

To Be Announced

2. PROJECT:

Alpine View, Juniper Crest, PAtriot Ridge
Herriman UT Blackridge Stake
Project Number: 5000844-22020201

3. LOCATION:

4617 West Patriot Ridge Drive
Herriman, UT

4. OWNER:

The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole
c/o
James Dzineku
Project Management Office
110 East Main Street
American Fork, UT 84003

5. CONSULTANT:

Bradley Gygi Architect & Associates, PLLC
PO Box 521048, Salt Lake City, UT 84152

6. DESCRIPTION OF PROJECT:

- A. Interior remodeling, new egress door and exterior site work, electrical and alarm system.
- B. Products or systems may be provided under a Value Managed Relationship (VMR) the Owner has negotiated with the supplier. VMR products and systems are indicated as such in the Specifications.

7. TYPE OF BID: Bids will be on a lump-sum basis. Segregated bids will not be accepted.

8. TIME OF SUBSTANTIAL COMPLETION: The time limit for substantial completion of this work will be sixty (60) calendar days and will be as noted in the Agreement.

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

10. BIDDING DOCUMENTS:

- A. Bidding Documents may be examined at the following plan room locations:
 - 1) Dodge Data and Analytics
Office # (859) 885-1091
Fax # (801) 606-7722
email: kim.mccallon@construction.com

Steps for downloading from McGraw-Hill Dodge:

Purchasing Individual Reports/Plans/Specs/Addenda from Dodge Data and Analytics

- Access the web-page <http://dodgeprojects.construction.com/>
- Search the Dodge Database by state (required) using the Dodge Report Number or Project Name for a single project report. To see a listing of all of the LDS projects in a particular state, enter the State name from the drop down box and then enter LDS in the second search box. Click Search.
- Select the project from the results list. By clicking on the blue project description, a more descriptive title will help to make sure you are purchasing the correct documents.
- When you find the correct project, select: Get This Report, Get Plans & Specs, or Monthly Access. Add to Cart and Proceed to Checkout or Continue Shopping. After the purchase, select View This Project.

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

Hard copy plans are available for viewing at Mountainlands Area Plan Room,
583 West 3560 South, Suite 4 Salt Lake City, UT 84115

Plans can also be viewed online with Mountainlands at: www.MAPRonline.com
- Membership is required for online service.

- B. Bidding Documents are available to invited Contractors with a deposit of \$_____ per set.
Deposit will be refunded if documents are returned complete and in good condition within five days of bid opening.

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

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

END OF DOCUMENT

INSTRUCTIONS TO BIDDERS (U.S.)

1. DOCUMENTS:

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

2. BIDDER'S REPRESENTATIONS:

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

3. BIDDING DOCUMENTS:

- A. Copies
 - 1) Owner will provide the Bidding Documents as set forth in the Invitation to Bid.
 - 2) Partial sets of Bidding Documents will not be issued.
- B. Interpretation or Correction of Bidding Documents
 - 1) Bidders will request interpretation or correction of any apparent errors, discrepancies, and omissions in the Bidding Documents.
 - 2) Corrections or changes to Bidding Documents will be made by written Addenda.
- C. Substitutions and Equal Products
 - 1) Equal products may be approved upon compliance with Contract Document requirements.
 - 2) Base bid only on materials, equipment, systems, suppliers or performance qualities specified in the Bidding documents.
 - 3) Where a specified product is identified as a "quality standard", products of other manufacturers that meet the performance, properties, and characteristics of the specified "quality standard" may be used without specific approval as a substitute.
- D. Addenda. Addenda will be sent to bidders and to locations where Bidding Documents are on file no later than one week prior to bid opening or by fax no later than 48 hours prior to bid opening.

4. BIDDING PROCEDURES:

- A. Form and Style of Bids

- 1) Use Owner's Bid Form.
- 2) Bid will be complete and executed by authorized representative of Bidder.
- 3) Do not delete from or add to the information requested on bid form.

B. Submission of Bids

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

C. Modification or Withdrawal of Bid

- 1) Bidder guarantees there will be no revisions or withdrawal of bid amount for 45 days after bid opening.
- 2) Prior to bid opening, bidders may withdraw bid by written request or by reclaiming bid envelope.
- 3) Prior to bid opening, bidder may mark and sign on the sealed envelope that bidder acknowledges any or all Addenda.

5. CONSIDERATION OF BIDS:

A. Opening Of Bids - See Invitation to Bid.

B. Acceptance Of Bid

- 1) No bidder will consider itself under contract after opening and reading of bids until Owner accepts Contractor's Bid Proposal by executing same.
- 2) Bidder's past performance, organization, subcontractor selection, equipment, and ability to perform and complete its contract in manner and within time specified, together with amount of bid, will be elements considered in award of contract.

6. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:

A. Agreement form will be "Agreement Between Owner and Contractor for Small Project (U.S.)" provided by Owner.

7. MISCELLANEOUS:

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

B. Examination Schedule for Existing Building and Site

- 1) Coordinate with FM Manager for access to the building during bidding.

END OF DOCUMENT

INFORMATION AVAILABLE TO BIDDERS (U.S.)

1. GEOTECHNICAL DATA

A. No report provided for this project.

2. ASBESTOS-CONTAINING MATERIAL (ACM)

A. Owner will provide report.

END OF DOCUMENT

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BID FORM

FOR GENERAL CONTRACT WORK (U.S.)

PROJECT IDENTIFICATION:

Alpine View, Juniper Crest, Patriot Ridge, Herriman UT Blackridge Stake, 5000844-22020201

OWNER:

The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole ("Owner")
James Dzineku, Project Management Office
110 East Main Street, American Fork, UT 84003

ARCHITECT:

Bradley Gygi Architect & Associates, PLLC
PO Box 521048, Salt Lake City, UT 84152

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 the Bidding Documents consisting of the Project Manual containing the Bidding Requirements, the Conditions of the Contract, and the Specifications, entitled Alpine View, Juniper Crest, Patriot Ridge, the Drawings entitled Alpine View, Juniper Crest, Patriot Ridge and dated 24 Jun 2022, and including sheets numbered G001, A101, A601, E101, E102, 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.

RESPECTFULLY SUBMITTED:

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

Date _____

License No. _____

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CONSTRUCTION MATERIAL ASBESTOS STATEMENT (U.S.)

**PROJECTS FOR:
THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS,
a Utah corporation sole**

Building Name: Alpine View, Juniper Crest, Patriot Ridge

Building Plan Type: Heritage 09T Meetinghouse

Building Address: 4617 West Patriot Ridge Drive, Herriman, UT

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

Project Number: 5000844-22020201

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

Bradley Gygi Architect & Associates, PLLC
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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SMALL PROJECT AGREEMENT BETWEEN OWNER AND CONTRACTOR Fixed Sum (U.S.)

The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole ("Owner") and _____ ("Contractor") enter into this *Small Project Agreement Between Owner and Contractor (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 Work.** Contractor will furnish all labor, materials, tools, and equipment necessary to complete the Work in accordance with the Contract Documents. The Work is all labor, materials, tools, equipment, construction, and services required by the Contract Documents (the "Work").

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

- a. This Agreement;
- b. Supplementary Conditions for Small Project Agreement Between Owner and Contractor (U.S.);
- c. The Specifications (Division 01 and Divisions _____);
- d. Drawings entitled and dated _____;
- e. Addendum No. with date(s) _____;
- g. All written Field Changes, written Construction Change Directives and written Change Orders when prepared and signed by Owner and Contractor.

4. **Compensation.** Owner will pay Contractor for performance of Contractor's obligations under the Contract Documents the sum of _____ Dollars (\$ _____) (the "Contract Sum"). This Contract Sum includes all labor, materials, equipment, tools, costs, expenses, work and services of Contractor and its subcontractors necessary to perform the Work in accordance with the terms of this Agreement, including without limitation travel, communications, and copying costs.

5. **Payment.**

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

6. **Extras and Change Orders.** Owner may order changes in the Work by altering, adding to, or deducting from the Work. In the event of such a change, the Contract Sum and/or the time of completion will be adjusted to reflect the change by means of a written Change Order signed by Contractor and Owner. Contractor will not commence work on any change until either: (a) Contractor and Owner have executed a Change Order; or (b) Owner has issued a written order for the change acknowledging that there is a dispute regarding the compensation adjustment relating to the change. If Contractor proceeds with a change in the Work without complying with the preceding sentence, Contractor agrees that it will not be entitled to any additional compensation for such change.
7. **Warranty and Correction of Work.** For all Work, services, labor, materials, products, and equipment provided under the Contract Documents, Contractor provides and extends to Owner all statutory, common law, and standard industry warranties as well as those warranties set forth in Owner's Contract Documents. Unless a longer period is specified by Owner's Contract Documents or otherwise, Contractor, at a minimum and in addition to all other warranties, warrants all Work under the Contract Documents for at least one year. Specifically, and without limitation, Contractor will promptly correct at its own expense:
- a. any portion of the Work which
 - 1) fails to conform to the requirements of the Contract Documents, or
 - 2) is rejected by the Owner as defective or because it is damaged or rendered unsuitable during installation or resulting from failure to exercise proper protection.
 - b. any defects due to faulty materials, equipment, or workmanship which appear within a period of one year from the date of completion of the Work or within such longer period of time as may be prescribed by law or the terms of any applicable special warranty required by the Contract Documents.
8. **Time of Completion.** Contractor will complete the Work and have it ready for Owner's inspection within _____ (_____) calendar days from Notice to Proceed issued by Owner. Time is of the essence. If Contractor is delayed at any time in the progress of the Work by any act or neglect of Owner, or by changes in the Work, or by strikes, lockouts, unusual delay in transportation, unavoidable casualties, or acts of nature beyond Contractor's control, then the time for completion will be extended by the time that completion of the Work is delayed. However, Contractor expressly waives any damages for any such delays.
9. **Owner Provided Items.** Owner may provide furnishings, equipment, and/or other items for the Project. Contractor will install items furnished by Owner and/or receive, store, and protect such items on site until the date Owner accepts the Project.
10. **Product Requirements.** Contractor will provide products that comply with Contract Documents, are undamaged, and, unless otherwise indicated, are new and unused at time of installation. Contractor will provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and for intended use and effect.
11. **Permits, Surveys, and Taxes.** Contractor will obtain and pay for all permits and licenses, and also pay any applicable taxes. Contractor will also obtain and pay for any surveys it needs to perform the Work.
12. **Independent Contractor Relationship.** Contractor is not an agent or employee of Owner but is an independent contractor.
13. **Comply with Laws.** Contractor will comply, and ensure that all subcontractors comply, with all applicable laws, ordinances, rules, regulations, covenants, and restrictions.
14. **Indemnity and Hold Harmless.**
- a. Contractor will indemnify and hold harmless Owner and Owner's representatives, employees, agents, architects, and consultants from and against any and all claims, liens, 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 or failure to perform 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 workers compensation acts, disability benefit acts, or other employee benefit acts.

15. **Work Restrictions.** Contractor will ensure that Contractor, its agents, employees, and subcontractors:

- a. Do not use or consume alcohol or cannabis, or illegally use drugs, on the Project Site or enter on or perform any Work on the Project Site while under their influence.
- b. Do not smoke or vape anything on the Project Site. Do not use tobacco in any form on the Project Site.
- c. Do not perform Work on the Project Site on Sundays except for emergency work.
- d. Refrain from using profanity or being discourteous or uncivil to others on the Project Site or while performing Work under this Agreement.
- e. Do not view or allow pornographic or other indecent materials on the Project Site.
- f. Do not play obnoxious and/or loud music on the Project Site. Do not play any music within existing facilities.
- g. Refrain from wearing immodest, offensive, or obnoxious clothing, while on the Project Site.
- h. Do not bring weapons on the Project Site.

16. **Safety Hazards.** Contractor will ensure that no work or services will be performed that may pose an undue safety hazard to Contractor, Contractor's employees, or any other person.

17. **Contractor's Insurance.** Prior to performing any work, Contractor will obtain and maintain during the term of this Agreement the following insurance:

- a. Workers Compensation Insurance or evidence of exemption.
- b. Employers Liability Insurance with minimum limits of the greater of \$500,000 E.L. each accident, \$500,000 E. L. disease-each employee, \$500,000 E.L. disease-policy limit or as required by the law of the state in which the Project is located.
- c. Commercial General Liability Insurance – ISO Form CG 00 01 (12/07) or equivalent Occurrence policy which will provide primary coverage to the additional insureds (the Owner and the Architect) in the event of any Occurrence, Claim, or Suit with:
 - 1) Limits of the greater of: Contractor's actual coverage amounts or the following:

- a) \$2,000,000 General Aggregate;
 - b) \$2,000,000 Products - Comp/Ops Aggregate;
 - c) \$1,000,000 Personal and Advertising Liability;
 - d) \$1,000,000 Each Occurrence; and
 - e) \$50,000 Fire Damage to Rented Premises (Each Occurrence)
- 2) Endorsements attached to the General Liability policy including the following or their equivalent:
- a) ISO Form CG-25-03 (05/09), Amendment of Limits of Insurance (Designated Project or Premises) describing the Agreement and specifying limits as shown above.
 - b) ISO Form CG 20 10 (07/04), Additional Insured – Owners, Lessees, Or Contractors (Form B), naming Owner and Architect as additional insureds.
- d. Automobile Liability Insurance, with:
- 1) Combined Single Limit each accident in the amount of no less than \$500,000; and
 - 2) Coverage applying to "Any Auto" or its equivalent.

Contractor will provide evidence of these insurance coverages to Owner by providing an ACORD 25 (2010/05) Form or its equivalent: (1) listing Owner as the Certificate Holder and Additional Insured on the general liability and any excess liability policies, (2) listing the insurance companies providing coverage (all companies listed must be rated in A.M. Best Company Key Rating Guide-Property-Casualty and each company must have a rating of B+ Class VII or higher), (3) attaching the endorsements set forth above for the Certificate of Liability Insurance, and (4) bearing the name, address and telephone number of the producer and signed by an authorized representative of the producer. (The signature may be original, stamped, or electronic.) Notwithstanding the foregoing, Owner may, in writing and at its sole discretion, modify these insurance requirements.

18. **Resolution of Disputes.** In the event there is any dispute arising under the Contract Documents which cannot be resolved by agreement between the parties, either party may submit the dispute with all documentation upon which it relies to Director of Architecture, Engineering, and Construction, 50 East North Temple, Salt Lake City, Utah 84150, who will convene a dispute resolution conference within thirty (30) days. The dispute resolution conference will constitute settlement negotiations and any settlement proposal made pursuant to the conference will not be admissible as evidence of liability. In the event that the parties do not resolve their dispute pursuant to the dispute resolution conference, either party may commence legal action to resolve the dispute. Any such action must be commenced within six (6) months from the first day of the dispute resolution conference or be time barred. Submission of the dispute to the Director as outlined above is a condition precedent to the right to commence legal action to resolve any dispute. In the event that either party commences legal action to adjudicate any dispute without first submitting the dispute to the Director, the other party will be entitled to obtain an order dismissing the litigation without prejudice and awarding such other party any costs and attorney fees incurred by that party in obtaining the dismissal, including without limitation copy costs, and expert and consultant fees and expenses. Pending final resolution of a dispute hereunder, Contractor will proceed diligently with the performance of its obligations pursuant to this Agreement.
19. **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 this Agreement by giving Written Notice to Owner and recover from Owner the percentage of the Contract Sum represented by the Work completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation or damages as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.

20. **Termination by Owner for Cause.** Should Contractor fail to timely provide Owner with the certificates of insurance, make a general assignment for the benefit of its creditors, fail to apply enough properly skilled workmen or specified materials to properly prosecute the Work in accordance with Contractor's schedule, or otherwise materially breach any provision of the Contract Documents, then Owner may, without any prejudice to any other right or remedy, give Contractor Written Notice thereof. If Contractor fails to cure its default within ten (10) days, Owner may terminate this Agreement by giving Written Notice to Contractor. 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, less any offsets. If such expense exceeds the unpaid balance, Contractor will pay the difference to Owner. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.
21. **Termination by Owner for Convenience.** Notwithstanding any other provision contained in the Contract Documents, Owner may, without cause and in its absolute discretion, terminate this Agreement at any time. In the event of such termination, Contractor will be entitled to recover from Owner the percentage of the Contract Sum equal to the percentage of the Work which Owner and/or its architect determines has been completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor. Without limitation, Contractor's indemnities and obligations as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.
22. **Enforcement.** In the event either party commences legal action to enforce or rescind any term of this Agreement, the prevailing party will be entitled to recover its attorney fees, costs and legal expenses, 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.
23. **Ownership of Materials, Products, and Intellectual Property Rights.** 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 and its subcontractors for products, services, and Work provided under this Agreement, such products, services, and Work of Contractor and its subcontractors constituting works made for hire. Neither Contractor nor its subcontractors will reuse any portion of such items provided by Owner or work products developed by Contractor or its subcontractors 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. Contractor shall obtain the written agreement of each of its subcontractors to the terms of this section prior to permitting the subcontractor to perform any services contemplated by this Agreement.
24. **Comply with Intellectual Property Rights of Others.** Contractor represents and warrants that no Work or services (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).

25. **Ownership and Use of Renderings and Photographs.** Renderings, photographs, and/or other images of or representing the services, Work, or any improvement on or relative to the Project Site, whether created before, during, or at completion of construction (and whether created by Owner, Contractor, or Contractor's subcontractors), are the property of the Owner. Contractor hereby transfers and assigns to Owner all ownership and intellectual property rights that Contractor and/or its subcontractors may have in and to all such renderings, photographs, and other images. The Owner reserves all rights including copyrights and other intellectual property rights to such renderings, photographs, and other images. No such renderings, photographs, or other images shall be used or distributed without written consent of the Owner.
26. **Public Statements.** Contractor will not make any statements or provide any information to the media about the Project or Work without the prior written consent of Owner. If Contractor receives any requests for information from media, Contractor will refer such requests to Owner.
27. **Confidentiality.** Contractor shall ensure that Contractor and its 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:
- a. The name or address of any affiliate, customer or contractor of Owner or any information concerning the transactions of any such person with Owner;
 - b. Any contracts, agreements, business plans, budgets or other financial information, renderings, photographs, and materials provided by Owner, relating to the Work or any improvement on the Project Site to the extent such has not been made available to the public by the Owner;
 - c. Any other information that is marked or noted as confidential at the time of its disclosure.
28. **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, or employees shall make any private commercial use of their relationship to Owner or the Project, including, without limitation:
- a. By referring to the Owner or 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 Work or 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 work, 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 Owner or Project.
- Notwithstanding the foregoing, Contractor may include a reference to Owner or the Project 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 or the Project is included with at least several other similar references to projects of different owners and is given no more prominence than such other references.
29. **Entire Agreement.** This Agreement contains the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either written or oral, relating to the Project. This Agreement may be amended only by a writing signed by both parties. This Agreement will not be construed to create a contractual relationship of any kind between any persons or entities other than Owner and Contractor.
30. **Assignment.** Contractor will not assign any right or obligation hereunder without the prior written consent of

the Owner, which consent may be granted or withheld in Owner's absolute discretion.

31. **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.

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

OWNER:	CONTRACTOR:
The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole	
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:

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SUPPLEMENTARY CONDITIONS

FOR SMALL PROJECT AGREEMENT BETWEEN OWNER AND CONTRACTOR (U.S.)

ITEM 1 - GENERAL

1. Conditions of the Small Project Agreement Between Owner and Contractor (U.S.) apply to each Division of the Specifications.
2. Provisions contained in Division 01 apply to all Divisions of the Specifications.

ITEM 2 - LIQUIDATED DAMAGES PAYABLE TO OWNER

This section may be included as a separate additional paragraph to the Small Project Agreement Between Owner and Contractor (U.S.), at Owner's discretion:

Delay in Completion of the Work. For each day after the expiration of the designated Time of Completion that Contractor has not completed the Work, Contractor will pay Owner the amount of Two Hundred dollars (\$200.00) per day as liquidated damages for Owner's loss of use and the added administrative expense to Owner to administer the Project during the period of delay. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorneys' fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay. Owner may deduct any liquidated damages or reimbursable expenses from any money due or to become due to Contractor. If the amount of liquidated damages and reimbursable expenses exceeds any amounts due to Contractor, Contractor will pay the difference to Owner within ten (10) days after receipt of a written request from Owner for payment.

ITEM 3 - PERMITS

1. Owner will pay the costs of permits, fees, impact fees and improvement bonds required by local agencies necessary for the proper execution and completion of the work. Contractor shall obtain all permits and pay all fees, which will be reimbursed by the Owner without markup. These costs shall not be included in the bid amount. Contractor will conform to all ordinances and covenants governing the Project Site and/or Work.

ITEM 4 - STATE SPECIFIC SUPPLEMENTARY CONDITIONS

UTAH STATE SALES TAX:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

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 Small Project Agreement Between Owner and Contractor (U.S.):

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

UTAH NOTICE OF COMPLETION:

Add the following to the Small Project Agreement Between Owner and Contractor (U.S.):

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

UTAH STATE PROGRESS PAYMENTS AND FINAL PAYMENT:

Replace paragraph 5 of the Small Project Agreement Between Owner and Contractor (U.S.) with the following:

5. Payment

- a. If the Contractor's Bid Proposal Amount is over \$100,000, Contractor will submit to Owner a schedule of values which allocates the Contractor's Bid Proposal Amount to various portions of the Work. This schedule, when accepted by Owner, will be used as a basis for reviewing Contractor's payment requests.
- b. Progress Payments: Not more than once each month, Contractor will submit a payment request to Owner. Owner will pay Contractor progress payments for work completed within fifteen (15) days after Owner receives:
 1. Contractor's progress payment request for work to date;
 2. A certification by Contractor that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the current payment request; and
 3. Conditional Waiver and Release Upon Progress Payment documents submitted by Contractor (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's progress payment request.
- c. Final Payment: Owner will make full and final payment of the Contract Sum due within thirty (30) days of the completion of all of the following requirements:
 1. Contractor has submitted its final payment request;
 2. Contractor has submitted a certification that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the final payment request; and
 3. Contractor has submitted Waiver and Release Upon Final Payment documents (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's final payment request.

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

If the aggregate of previous payments made by Owner exceeds the amount due Contractor,

Contractor will reimburse the difference to Owner.

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

END OF DOCUMENT

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

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

SECTION 01 1000 SUMMARY

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

SECTION 01 1200 MULTIPLE CONTRACT SUMMARY

- A. Separate Contracts:
1. Contracts may be issued by Owner for performance of certain construction operations at Project site.
 2. Contractor will afford other contractors reasonable opportunity to place and store their materials and equipment on site and to perform their work and will properly connect and coordinate its work with theirs where applicable:

SECTION 01 1400 WORK RESTRICTIONS

- A. Project Conditions:
1. During construction period, Contractor will have use of premises for construction operations. Contractor will ensure that Contractor, its employees, subcontractors, and employees comply with following requirements:
 - a. Confine operations to areas within Contract limits shown on Drawings. Do not disturb portions of site beyond Contract limits.
 - b. Do not allow alcoholic beverages, illegal drugs, or persons under their influence on Project Site.
 - c. Do not allow use of tobacco in any form on Project Site.
 - d. Do not allow pornographic or other indecent materials on site.

- e. Do not allow work on Project Site on Sundays except for emergency work.
 - f. Refrain from using profanity or being discourteous or uncivil to others on Project Site or while performing The Work.
 - g. Wear shirts with sleeves, wear shoes, and refrain from wearing immodest, offensive, or obnoxious clothing, while on Project Site.
 - h. Do not allow playing of obnoxious and loud music on Project Site. Do not allow playing of any music within existing facilities.
 - i. Do not build fires on Project Site.
 - j. Do not allow weapons on Project Site, except those carried by law enforcement officers and/or other uniformed security personnel who have been retained by Owner or Contractor to provide security services.
2. Existing Facilities:
- a. If Owner will occupy existing building, reasonably accommodate use of existing facilities by Owner.

SECTION 01 3000 ADMINISTRATIVE REQUIREMENTS

A. Administrative Requirements:

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

SECTION 01 3100 PROJECT MANAGEMENT AND COORDINATION

A. Multiple Contract Coordination:

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

B. Project Meetings And Conferences:

1. Attend preconstruction conference and organizational meeting scheduled by Architect or Owner Representative at Project site or other convenient location.
2. Be prepared to discuss items of significance that could affect progress, including such topics as:
 - a. Construction schedule, equipment deliveries, general inspection of tests, preparation of record documents and O&M manuals, project cleanup, security, shop drawings, samples, use of premises, work restrictions, and working hours.
2. Pre-Installation Conferences.
 - a. Attend pre-installation conferences specified in Contract Document.

SECTION 01 3300 SUBMITTAL PROCEDURES

A. Submittal Procedure:

1. Coordination: Coordination preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently before performance of related construction activities to avoid delay.
2. Process Time: Allow sufficient review time so installation will not be delayed by time required to process submittals.
3. Identification: Place permanent label or title block on each submittal for identification. Include name of entity that prepared each submittal on label or title block.
4. Transmittal: Package each submittal appropriately for transmittal and handling.

General:

- a. Transmit each submittal from Contractor to Architect using transmittal letter. Transmittal letter shall provide sufficient space for Architect review stamp and comments (5" wide x 3" high minimum space).

- b. All submittals shall 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.
- c. Submittals received from sources (both electronic and physical sources) other than Contractor or not marked with Contractor's approval will be returned without action.

Electronic Submittals:

- d. Preferred method of transmittal for most submittals previously in paper format is via email attachment to Architect in .pdf format.
- e. Maintain original size of .pdf files submitted from subcontractors (24"x36" drawings shall remain original size in electronic format, for example).
- f. Electronic submittals shall be submitted as a single file (.pdf) per submittal item / discipline.
- g. Do not submit multiple files, cut sheets, product information, etc.
- h. Contractor shall compile each submittal including transmittal letter as first page of each submittal.
- i. Contractor shall submit each submittal item / discipline in a separate email, not multiple submittals in a single email.
- j. Subject line of submittal email shall include project name and submittal title / category.

Physical Submittals:

- k. Submittals requiring hard copies or including physical product samples shall be delivered or shipped to Architect's office. Deliveries are accommodated from 8:30am to 4:30pm Monday through Friday on regular business days.
- l. Package each submittal appropriately for transmittal and handling. On transmittal, record relevant information and requests for data.

B. Action Submittals:

- 1. Product Data: Submit product data, as required by individual Sections of Specifications.
- 2. Shop Drawings: Submit shop drawings for review and designate (stamp) approval of shop drawings.
- 3. Samples: Samples used for comparison with actual component to be installed. Samples when accepted will be used for quality comparisons throughout course of construction.

C. Informational Submittals:

- 1. 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.
 - a. Return copies or PDF files marked with action taken and with corrections or modifications required.

D. Closeout Submittals:

- 1. Submittals that occur during project closeout.

SECTION 01 3500 SPECIAL PROCEDURES

A. Quality Assurance:

- 1. Hot Work Permit (Available from Owner's Representative):
 - a. Required for doing hot work involving open flames or producing heat or sparks such as:
 - 1) Brazing.
 - 2) Cutting.
 - 3) Grinding.
 - 4) Soldering.
 - 5) Thawing pipe.
 - 6) Torch applied roofing.
 - 7) Welding.

SECTION 01 4000 QUALITY REQUIREMENTS

A. Administrative Requirements:

- 1. Conflicting Requirements:
 - 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.
- 2. Minimum Quantity or Quality Levels:

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

SECTION 01 4301 QUALITY ASSURANCE - QUALIFICATIONS

- A. Qualifications: Qualifications in this Section establish minimum qualification levels required; individual Specification Sections specify additional requirements:
1. Fabricator / Supplier / Installer Qualifications:
 - a. Firm experienced in producing products similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units:
 - 1) Where heading '*VMR (Value Managed Relationship) Suppliers / Installers*' is used to identify list of specified suppliers or installers, Owner has established relationships that extend beyond requirements of this Project. No other suppliers / installers will be acceptable. Follow specified procedures to preserve relationships between Owner and specified suppliers / installers and advantages that accrue to Owner from those relationships.
 - 2) Where heading '*Acceptable or Approved Suppliers / Installers / Fabricators*' is used to identify list of specified suppliers / installers / fabricators, use only one of listed suppliers / installers / fabricators. No others will be acceptable.
 2. Factory-Authorized Service Representative Qualifications:

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

SECTION 01 4523 TESTING AND INSPECTION SERVICES

- A. Submittals:
 1. Certificates: Testing Agency will submit certified written report of each inspection, test, or similar service.
 2. Tests and Evaluation Reports:
 - a. Testing Agency or Agencies will prepare logs, test reports, and certificates applicable to specific tests and inspections and deliver copies to Owner's Representative and to each of following if involved on project: Architect, Consulting Engineers (Engineer of Record), General Contractor, Authorities Having Jurisdiction (if required).
 3. Testing Agency:
 - a. Qualifications of Testing Agency management, personnel, inspector and technicians designated to project.
 - b. Provide procedures for non-destructive testing, equipment calibration records, personnel training records, welding inspection, bolting inspection, shear connector stud inspection, and seismic connection inspections.
- B. Quality Assurance:
 1. Owner or Owner's designated representative(s) will perform quality assurance. Owner's quality assurance procedures may include observations, inspections, testing, verification, monitoring and any other procedures deemed necessary by Owner to verify compliance with Contract Documents.

2. Owner will employ independent Testing Agencies to perform certain specified testing, as Owner deems necessary.
 3. Certification:
 - a. Product producers and associations, which have instituted approved systems of quality control and which have been approved by document approval agencies, are not required to have further testing.
 - b. Concrete mixing plants, plants producing fabricated concrete and wood or plywood products certified by agency, lumber, plywood grade marked by approved associates, and materials or equipment bearing underwriters' laboratory labels require no further testing and inspection.
 4. Written Practice for Quality Assurance:
 - a. Testing Agency will maintain written practice for selection and administration of inspection personnel, describing training, experience, and examination requirements for qualification and certification of inspection personnel.
 - b. Written practice will describe testing agency procedures for determining acceptability of structure in accordance with applicable codes, standards, and specifications.
 - c. Written practice will describe Testing Agency inspection procedures, including general inspection, material controls, visual welding inspection, and bolting inspection.
- C. Quality Control:
1. Quality Control will be sole responsibility of Contractor. Contractor will be responsible for testing, coordination, start-up, operational checkout, and commissioning of all items of the Work included in Project. All costs for these services will be included in Contractor's cost of the Work.
 2. Notify results of all Testing and Inspection performed by Contractor's independent Testing Agencies to Architect and/or Owner's Representative within 24 hours of test or inspection having been performed:
 - a. Testing and Inspection Reports will be distributed as follows:
 - 1) 1 copy to Owner's Representative.
 - 2) 1 copy to Architect.
 - 3) 1 copy to Consulting Engineer(s) (Engineer of Record).
 - 4) 1 copy to Authorities Having Jurisdiction (if required).
 3. Contractor's Responsibility:
 - a. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents.
 - b. Tests and inspections that are not explicitly assigned to Owner are responsibility of Contractor.
 - c. Cooperate with Testing Agency(s) performing required inspections, tests, and similar services and provide reasonable auxiliary services as requested. Notify Testing Agency before operations to allow assignment of personnel. Auxiliary services required include but are not limited to:
 - 1) Providing access to the Work and furnishing incidental labor, equipment, and facilities deemed necessary by Testing Agency to facilitate inspections and tests at no additional cost to Owner.
 - 2) Taking adequate quantities of representative samples of materials that require testing or helping Testing Agency in taking samples.
 - 3) Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
 - 4) Providing Testing Agency with preliminary design mix proposed for use for materials mixes that require control by Testing Agency.
 - d. For any requested inspection, Contractor will complete prior inspections to ensure that items are ready for inspection.
 - e. All Work is subject to testing and inspection and verification of correct operation.
 - f. Comply:
 - 1) Upon completion of Testing Agency's inspection, testing, sample-taking, and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes.
 - 2) Comply with Contract Documents in making such repairs.
 - g. Data:
 - 1) Furnish records, drawings, certificates, and similar data as may be required by testing and inspection personnel to assure compliance with Contract Documents.
 - h. Defective Work (Non-Conforming Work): Non-conforming Work as covered in General Conditions applies, but is not limited to following requirements Protection:
 - 1) Where results of inspections, tests, or similar services show that the Work does not comply with Contract Document requirements, correct deficiencies in the Work promptly to avoid work delays.
 - 2) Where testing personnel take cores or cut-outs to verify compliance, repair prior to acceptance.

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

- c. Testing Agency will have full authority to see that the Work is performed in strict accordance with requirements of Contract Documents and directions of Owner's Representative and/or Architect.
 - d. Testing Agency will not provide additional testing and inspection services beyond scope of the Work without prior approval of Owner's Representative and/or Architect.
3. Testing Agency Duties:
- a. Independent Testing Agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual specification Sections will cooperate with Architect or Owner Representative and Contractor in performance of its duties and will provide qualified personnel to perform required inspections and tests.
 - b. Testing Agency will test or obtain certificates of tests of materials and methods of construction, as described herein or elsewhere in technical specification.
 - c. Testing Agency will provide management, personnel, equipment, and services necessary to perform testing functions as outlined in this section.
 - d. Testing Agency must have experience and capability to conduct testing and inspecting indicated by ASTM standards and that specializes in types of tests and inspections to be performed.
 - e. Testing Agency will comply with requirements of ASTM E329, ASTM E543, ASTM C1021, ASTM C1077, ASTM C1093, ASTM D3666, ASTM D3740, and other relevant ASTM standards.
 - f. Testing Agency must calibrate all testing equipment at reasonable intervals (minimum yearly) with accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.
 - g. Welding Procedure Review: Testing Agency will provide review and approval or rejection of all welding procedures to be used and verify compliance with all reference standard requirements.
4. Testing and Inspection Reports:
- a. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
 - b. Laboratory Reports: Testing Agency will furnish reports of materials and construction as required, including:
 - 1) Description of method of test.
 - 2) Identification of sample and portion of the Work tested:
 - (a) Description of location in the Work of sample.
 - (b) Time and date when sample was obtained.
 - (c) Weather and climatic conditions at time when sample was obtained.
 - 3) Evaluation of results of tests including recommendations for action.
 - c. Inspection Reports:
 - 1) Testing Agency will furnish "Inspection at Site" reports for each site visit documenting activities, observations, and inspections.
 - 2) Include notation of weather and climatic conditions, time and date conditions and status of the Work, actions taken, and recommendations or evaluation of the Work.
 - d. Reporting Testing and Inspection (Conforming Work):
 - 1) Submit testing and inspection reports as required within twenty four (24) hours of test or inspection having been performed.
 - e. Reporting Testing and Inspection Defective Work (Non-Conforming Work):
 - 1) Testing Agency, upon determination of irregularities, deficiencies observed or test failure(s) observed in the Work during performance of its services of test or inspection having been performed, will:
 - (a) Verbally notify results to Architect, Contractor, and Owner's Representative within one hour of test or inspection having been performed (if Defective Work (Non-Conforming Work) is incorporated into project).
 - (b) Submit written inspection report and test results as required within twenty four (24) hours of test or inspection having been performed.
 - f. Final Report:
 - 1) Submit final report of tests and inspections at Substantial Completion, which identify unresolved deficiencies.
- F. Architect's Responsibility:
1. Architect Duties:
 - a. Notify Owner's Representative before each test and/or inspection:
- G. Field Quality Control:
1. Field Tests And Inspections:

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

SECTION 01 5000 TEMPORARY FACILITIES AND CONTROLS

A. Administrative Requirements:

1. Contractor is responsible for security of materials, tools, and equipment. Do not permit others to use building keys provided by Owner. Safeguard building and contents while the Work is being performed and secure building when the Work is finished for day.
2. 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:
 - a. Avoid use of tools and equipment that produce harmful noise.
 - b. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near site.
 - c. Protect the Work, materials, apparatus, and fixtures from injury due to weather, theft, and vandalism.
3. Existing restroom facilities may be used by Contractor. Clean restrooms and portions of existing building used in accessing restrooms daily. If existing facilities are not usable, provide and maintain temporary sanitary toilet.

B. Temporary Barriers And Enclosures:

1. Protect existing trees and plants. Remove and replace vegetation that dies or is damaged beyond repair due to construction activities.
2. Erect adequate barricades, warning signs, and lights necessary to protect persons from injury or harm.
3. Provide temporary enclosures at exterior building openings for security and protection from weather, theft, and vandalism. Erect and maintain dust-proof partitions and enclosures as required to prevent spread of dust and fumes to occupied portions of building.
4. 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:
 - a. 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.
 - b. 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').
 - c. 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.
 - d. 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.
 - e. This Specification Section does not preclude Contractor from providing its own camera(s), signage, or notices pursuant to terms and conditions of this Agreement. Neither does this Section reduce, expand or modify any other right or obligation of Owner pursuant to terms of this Agreement.

C. Utilities:

1. Electrical Power: Owner will provide electric power for construction activities within limits available at existing facility.
2. Fire Protection: Exercise caution to avoid fire damage: Do not build fires on site.
3. Heating, Cooling, And Ventilation:
 - a. Permanent mechanical system may be operated upon following conditions:
 - 1) Do not interfere with normal set-back temperature patterns except as approved by Project Manager.
 - 2) Do not operate system when the Work causing airborne dust is occurring or when dust caused by such Work is present without first installing temporary filtering system.
4. Lighting: Existing lighting system may be used by Contractor.
5. Water Service: Contractor will use existing water supply for construction purposes to extent of existing facilities.

SECTION 01 6100 COMMON PRODUCT REQUIREMENTS

A. Administrative Requirements:

1. Provide products that comply with Contract Documents, are undamaged, and, unless otherwise indicated, are new and unused at time of installation. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and for intended use and effect.

SECTION 01 6200 PRODUCT OPTIONS

A. Product selection is governed by Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include:

1. Substitutions And Equal Products:
 - a. Generally speaking, substitutions for specified products and systems, as defined in Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
 - b. Approved Products / Manufacturers / Suppliers / Installers:
 - 1) Category One:
 - (a) Owner has established 'Value Managed Relationships' that extend beyond requirements of this Project. No substitutions or equal products will be allowed on this Project.
 - (b) Follow specified procedures to preserve relationships between Owner and specified manufacturers / suppliers and advantages that accrue to Owner from those relationships.
 - 2) Category Two:
 - (a) Owner has established National Contracts that contain provisions extending beyond requirements of this Project. No substitutions or equal products will be allowed on this Project.
 - (b) Follow specified procedures to preserve relationships between Owner and specified manufacturers / suppliers and advantages that accrue to Owner from those relationships.
 - 3) Category Three:
 - (a) Specified products are provided to Church Projects under a National Account Program. Use these products to preserve advantages that accrue to Owner from those programs. No substitutions or equal products will be allowed on this Project.
 - 4) Category Four:
 - (a) Provide only specified products available from manufacturers listed. No substitutions, private-labeled, or equal products, or mixing of manufacturers' products is allowed on this Project.
 - (b) In Sections where lists recapitulating Manufacturers previously mentioned in Section are included under heading '*Manufacturers*' or '*Approved Manufacturers*', this is intended as convenience to Contractor as listing of contact information only. It is not intended that all manufacturers in list may provide products where specific products and manufacturers are listed elsewhere in Section.
 - c. Acceptable Products / Manufacturers / Suppliers / Installers:
 - 1) Type One: Use specified products / manufacturers unless approval to use other products / manufacturers has been obtained from Architect or Owner Representative by Addendum.
 - 2) Type Two: Use specified products / manufacturers unless approval to use other products and manufacturers has been obtained from Architect or Owner Representative in writing before installing or applying unlisted or private-labeled products.
 - 3) Use 'Equal Product Approval Request Form' to request approval of equal products, manufacturers, or suppliers before bidding or before installation, as noted in individual Sections.
 - d. Quality / Performance Standard Products / Manufacturers:
 - 1) Class One: Use specified product / manufacturer or equal product from specified manufacturers only.
 - 2) Class Two: Use specified product / manufacturer or equal product from any manufacturer.
 - 3) Products / manufacturers used will conform to Contract Document requirements.

SECTION 01 6400 OWNER-FURNISHED PRODUCTS

A. Administrative Requirements:

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

SECTION 01 6600 DELIVERY, STORAGE, AND HANDLING REQUIREMENTS

- A. Administrative Requirements:
 - 1. Deliver, store, and handle products according to manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
- B. Delivery, Storage, and Handling:
 - 1. Delivery and Acceptable Requirements:
 - a. Deliver, store, and handle products according to manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
 - b. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - c. Deliver products to site in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - d. Inspect products upon delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.
 - 2. 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 weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

SECTION 01 7000 EXECUTION REQUIREMENTS

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

SECTION 01 7400 CLEANING AND WASTE MANAGEMENT

- A. Disposal Of Waste:

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

SECTION 01 7700 CLOSEOUT PROCEDURES

- A. General:
1. Closeout process consists of three specific project closeout inspections. Contractor shall plan sufficient time in construction schedule to allow for required inspections before expiration of Contract Time.
 2. Contractor shall conduct his own inspections of The Work and shall not request closeout inspections until The Work of the contract is reasonably complete and correction of obvious defects or omissions are complete or imminent.
 3. Date of Substantial Completion shall not occur until completion of construction work, unless agreed to by Architect / Owner's Representative and included on Certificate of Substantial Completion.
- B. Preliminary Closeout Review:
1. When Architect, Owner and Contractor agree that project is ready for closeout, Pre-Substantial Inspection shall be scheduled. Preparation of floor substrate to receive carpeting and any work which could conceivably damage or stain carpet must be completed, as carpet installation will be scheduled immediately following this inspection.
 2. Prior to this inspection, completed test and evaluation reports for HVAC system and font, where one occurs, are to be provided to Project Manager, Architect, and applicable consultants.
 3. Architect, Owner and Contractor review completion of punch list items. When Owner and Architect confirm that Contractor has achieved Substantial Completion of The Work, Owner, Architect and Contractor will execute Certificate of Substantial Completion that contains:
 - a. Punch list of items requiring completion and correction will be created.
 - b. Time frame for completion of punch list items will be established, and date for Substantial Completion Inspection shall be set.
- C. Substantial Completion Inspection:
1. When Architect, Owner and Contractor agree that project is ready for Substantial Completion, an inspection is held. Punch list created at Pre-Substantial Inspection is to be substantially complete.
 2. Prior to this inspection, Contractor shall discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups and similar elements.
 3. Architect, Owner and Contractor review completion of punch list items. When Owner and Architect confirm that Contractor has achieved Substantial Completion of The Work, Owner, Architect and Contractor will execute Certificate of Substantial Completion that contains:
 - a. Date of Substantial Completion.

- b. Punch List Work not yet completed, including seasonal and long lead items.
 - c. Amount to be withheld for completion of Punch List Work.
 - d. Time period for completion of Punch List Work.
 - e. Amount of liquidated damages set forth in Supplementary Conditions to be assessed if Contractor fails to complete Punch List Work within time set forth in Certificate.
4. Contractor shall present Closeout Submittals to Architect and place tools, spare parts, extra stock, and similar items required by Contract Documents in locations as directed by Facilities Manager.
- D. Final Acceptance Meeting:
1. When punch list items except for any seasonal items or long lead items which will not prohibit occupancy are completed, Final Acceptance Meeting is held.
 2. Owner, Architect and Contractor execute Owner's Project Closeout - Final Acceptance form, and verify:
 - a. All seasonal and long lead items not prohibiting occupancy, if any, are identified, with committed to completion date and amount to be withheld until completion.
 - b. Owner's maintenance personnel have been instructed on all system operation and maintenance as required by the Contract Documents.
 - c. Final cleaning requirements have been completed.
 3. If applicable, once any seasonal and long lead items are completed, Closeout Inspection is held where Owner and Architect verify that The Work has been satisfactorily completed, and Owner, Architect and Contractor execute Closeout portion of the Project Closeout - Final Acceptance form.
 4. When Owner and Architect confirm that The Work is satisfactorily completed, Architect will authorize final payment.

SECTION 01 7800 CLOSEOUT SUBMITTALS

- A. Administrative Requirements:
1. Project Record Documents:
 - a. Do not use record documents for construction purposes:
 - 1) Protect from deterioration and loss in secure, fire-resistive location.
 - 2) Provide access to record documents for reference during normal Working hours.
 - b. Maintain clean, undamaged set of Drawings. Mark set to show actual installation where installation varies from the Work as originally shown. Give particular attention to concealed elements that would be difficult to measure and record at later date:
 - 1) Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
 - 2) Mark new information that is important to Owner, but was not shown on Contract Drawings.
 - 3) Note related Change Order numbers where applicable.
 2. As Built Record Drawings:
 - a. Provide two full-size sets of prints and PDF file of As Built Record Drawings to 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. In addition, Architect will submit to Owner updated AutoCAD as built record drawing files with associated plot style tables or the Revit as built record model files, as specified by Owner.
- B. Operations And Maintenance Manual:
1. General:
 - a. Include closeout submittal documentation as required by Contract Documentation. Include only closeout submittals as defined in individual specification section.
 - b. Submittal Format: Digital copies unless otherwise noted, required for each individual specification section that include 'Closeout Submittals'.
 2. Project Manual:
 - c. 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: (digital format only).
 4. Operations and Maintenance Data (digital format only):
 - a. Operations and maintenance submittals includes cleaning instructions, maintenance instructions, operations instructions, equipment list, and parts lists.
 5. Warranty Documentation: Digital format of final, executed warranties.
 6. Record Documentation:
 - a. Documentation includes Certifications, color and pattern selections, Design Date, Geotechnical Evaluation Reports (soils reports), Manufacture Reports, Literature or cut sheets, Shop Drawings, Source Quality Control, Special Procedures, and Testing and Inspection Reports.
 7. Software: Audio and Video System software, programming and set-files.
 8. Irrigation Plan: Laminated and un-laminated reduced sized hard copies.
 9. Landscape Management Plan (LMP):
 - a. Irrigation Section:
 - (1) Documentation required by Sections under 32 8000 Heading: Irrigation.
 - b. Landscaping Section:
 - (1) Documentation required by Sections under 32 8000 Heading: Irrigation.
- C. Warranties:
1. When written guarantees beyond one (1) year after substantial completion are required by Contract Documents, secure such guarantees and warranties properly addressed and signed in favor of Owner. Include these documents in Operations & Maintenance Manual(s) specified above.
 2. Delivery of guarantees and warranties will not relieve Contractor from obligations assumed under other provisions of Contract Documents.

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 3923 MEMBRANE CONCRETE CURING

03 4000 PRECAST CONCRETE

03 4800 PRECAST CONCRETE SPECIALTIES

03 6000 GROUTING

03 6213 NON-METALLIC NON-SHRINK GROUT

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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 REFERENCES

- A. Reference Standards:
 - 1. American Concrete Institute:
 - a. ACI 318-14, 'Building Code Requirements for Structural Concrete and Commentary'.

1.3 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.

1.4 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. Form Release / Finish Agent:
 - 1. Vertical, Exposed Surfaces or Unexposed Surfaces:
 - a. Chemically acting type.
 - b. Type Two Acceptable Products.
 - 1) Crete-Lease 727 or 20-VOC by Cresset Chemical Co, Weston, OH www.cresset.com.
 - 2) Clean Strip (J-1 or J-3 VOC) by Dayton Superior Specialty Chemicals, Kansas City, KS www.daytonsuperiorchemical.com.
 - 3) E-Z Strip or DEBOND Form Coating by L & M Construction Chemicals, Omaha, NE www.lmcc.com.
 - 4) Q-2 by Unitex, Kansas City, MO www.unitex-chemicals.com.
 - 5) U S Spec SlicKote by U S Mix Products Co www.usspec.com.
 - 6) Duogard or Duogard II by W R Meadows, Elgin, IL www.wrmeadows.com.
 - 7) Equal as approved by Architect before use. See Section 01 6200.
- C. Expansion / Contraction Joints:
 - 1. **1/2 inch (13 mm)** thick.
 - 2. Manufactured commercial fiber type:
 - a. Meet requirements of ASTM D1751.
 - b. Type Two Acceptable Products:
 - 1) Conflex by Knight-Celotex, Northfield, IL www.aknightcompany.com.
 - 2) Sealtight by W R Meadows Inc, Hampshire, IL www.wrmeadows.com.
 - 3) Equal as approved by Architect before installation. See Section 01 6200.
 - 3. Recycled Vinyl:
 - a. Light gray color.
 - b. Type Two Acceptable Products:
 - 1) Proflex by Oscoda Plastics Inc, Oscoda, MI www.oscodaplastics.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.
 - 5. Use metal cold joint forms when unable to place concrete for footings, foundations, and slabs in continuous pours.
- 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 (10 deg C) 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

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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. Expansion anchors for concrete.
 - c. J-bolts and headed cast-in-place bolts.
 - d. Screw anchors for concrete.
 - e. 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 REFERENCES

- A. Reference Standards:
 - 1. American Concrete Institute:
 - a. ACI 355.4-11, 'Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary'.
 - b. ACI 548.12-12, 'Specification for Bonding Hardened Concrete and Steel to Hardened Concrete with an Epoxy Adhesive'.
 - 2. American National Standards Institute / American Welding Society (Following are specifically referenced for Structural Steel testing):
 - a. ANSI/AWS D1.1/D1.1M:2015, 'Structural Welding Code - Steel'.
 - 3. ASTM International:
 - a. ASTM A307-14, 'Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength'.
 - b. ASTM A563-15, 'Standard Specification for Carbon and Alloy Steel Nuts'.
 - c. ASTM A706/A706M-16, 'Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement'.
 - d. ASTM F1554-15, 'Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength'.
 - e. ASTM F3125/F3125-15a, 'Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions'.
 - 4. International Code Council (IBC) (2015 or latest approved AHJ edition):
 - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.

1.3 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.

1.4 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.

1.5 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'.

1.6 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 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 (6.4 mm)** by **3 inch (76 mm)** x **3 inch (76 mm)** 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 (50 mm)** minimum conforming to requirements of ASTM F1554, Grade A.
 - 2) Anchor hook to project **2 inches (50 mm)** minimum including bolt diameter.
 - b. Headed Bolts:
 - 1) Headed type threaded **2 inches (50 mm)** minimum conforming to requirements of ASTM F1554, Grade A.
 4. Reinforcing Bars:
 - a. Composed of deformed carbon steel meeting requirements of ASTM A615/A615M, Grade 60.
 5. 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.
6. 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.
7. 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 0000: 'General Requirements':
 - a. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
 - b. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 2. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
 - 3. 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 REFERENCES

- A. Association Publications:
 - 1. American Concrete Institute:
 - a. ACI 'Detailing Manual' (2004 Edition).
 - 2. Concrete Reinforcing Steel Institute (CRSI):
 - a. CRSI, 'Manual of Standard Practice' (2009 28th Edition).
- B. Reference Standards:
 - 1. American Concrete Institute:
 - a. ACI 117-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary' (Reapproved 2015).
 - b. ACI 318-14, 'Building Code Requirements for Structural Concrete and Commentary'.
 - 2. ASTM International (Following are specifically referenced for reinforcement bars testing):
 - a. ASTM A615/A615M-18, 'Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement'.

1.3 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.

1.4 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.

1.5 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'.

1.6 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 (CSRI, 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)**.

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. Concrete accessories.
 2. Detectable warning panels.
 3. Inserts, bolts, boxes, templates, and fastening devices for other work, including those for bases only for Mechanical and Electrical.
 4. Light pole base anchors.
 5. Membrane Concrete Curing.
 6. Pipe bollards.
- 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 3923: 'Membrane Concrete Curing' for quality of curing materials used.
 6. Section 03 4800: 'Precast Concrete Specialties'.
 7. Section 07 9213: 'Elastomeric Joint Sealant' for quality of sealants.
 8. 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.
 9. Section 31 1123: 'Aggregate Base' for aggregate base under miscellaneous cast-in-place concrete and exterior slabs, under interior slabs-on-grade concrete, asphalt paving, and concrete paving.
 10. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
 11. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
 12. Section 31 2323: 'Fill' for compaction procedures and tolerances.
 13. 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.
 14. Furnishing of items to be embedded in concrete specified in Section involved.
 15. Owner will provide concrete leveling compounds and patching compounds required for carpet installation.

1.2 REFERENCES

- A. Association Publications:

1. American Concrete Institute, Farmington Hills, MI www.concrete.org. Abstracts of ACI Periodicals and Publications.
 - a. Certifications:
 - 1) ACI CP-1(16), 'Technical Workbook for ACI Certification of Concrete Field Testing Technician-Grade 1'.
 - 2) ACI CP-10(10), 'Craftsman Workbook for ACI Certification of Concrete Flatwork Technician/Finisher'.
 - 3) ACI CP-19(16), 'Technical Workbook for ACI Certification of Concrete Strength Testing Technician'.
- B. Definitions:
 1. Cold Weather, as referred to in this Section, is four (4) hours with ambient temperature below **40 deg F (4.4 deg C)** in twenty-four (24) hour period.
 2. Floor Flatness (F_F): Rate of change in elevation of floor over **12 inches (305 mm)** section.
 3. Floor Levelness (F_L): Measures difference in elevation between two points which are **10 feet (3.05 m)** apart.
 4. Hot Weather, as referred to in this Section, is ambient air temperature above **100 deg F (38 deg C)** or ambient air temperature above **90 deg F (32 deg C)** with wind velocity **8 mph (12.9 kph)** or greater.
- C. Reference Standards:
 1. American Association of State and Highway Transportation Officials:
 - a. AASHTO M 153-06 (2016), 'Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction'.
 2. American Concrete Institute
 - a. ACI 117-10 (R2015): 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
 - b. ACI 305.1-14, 'Specification for Hot Weather Concreting'.
 - c. ACI 306.1-90 (R2002), 'Standard Specification for Cold Weather Concreting'.
 - d. ACI 318-14, 'Building Code Requirements for Structural Concrete' (ACI 318) and 'Commentary on Building Code Requirements for Structural Concrete' (ACI 318R).
 3. ASTM International:
 - a. ASTM C31/C31M-15, 'Standard Practice for Making and Curing Concrete Test Specimens in the Field'.
 - b. ASTM C33/C33M-16, 'Standard Specification for Concrete Aggregates'.
 - c. ASTM C39/C39M-15a, 'Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens'.
 - d. ASTM C94/C94M-16, 'Standard Specification for Ready-Mixed Concrete'.
 - e. ASTM C140/C140M-16, 'Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units'.
 - f. ASTM C143/C143M-15, 'Standard Test Method for Slump of Hydraulic-Cement Concrete'.
 - g. ASTM C150/C150M-16, 'Standard Specification for Portland Cement'.
 - h. ASTM C172/C172M-14a, 'Standard Practice for Sampling Freshly Mixed Concrete'.
 - i. ASTM C173/C173M-16, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method'.
 - j. ASTM C192/C192M-16a, 'Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory'.
 - k. ASTM C231/C231M-14, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method'.
 - l. ASTM C260/C260M-10a, 'Standard Specification for Air-Entraining Admixtures for Concrete'.
 - m. ASTM C330/C330M-14, 'Standard Specification for Lightweight Aggregates for Structural Concrete'.
 - n. ASTM C494/C494M-15a, 'Standard Specification for Chemical Admixtures for Concrete'.
 - o. ASTM C496/C496M-11, 'Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens'.
 - p. ASTM C567/C567M-14, 'Standard Test Method for Determining Density of Structural Lightweight Concrete'.
 - q. ASTM C595/C595M-16, 'Standard Specification for Blended Hydraulic Cements'.

- r. ASTM C618-15, 'Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete'.
 - s. ASTM C1077-16, 'Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation'.
 - t. ASTM C1157/C1157M-11, 'Standard Performance Specification for Hydraulic Cement'.
 - u. ASTM D1751-04(2013), 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)'.
 - v. ASTM E329-14a: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
 - w. ASTM E1155-14, 'Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers'.
4. 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'.

1.3 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'.
 - 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 layout plan for control and expansion joints, fillers for sidewalks, curbs, and gutters:
 - 1) Review jointing requirements.
 - 2) Joint layout for concrete paving is specified in Section 32 1313.
 - n. Review smooth rubbed concrete finish procedures and requirements (applied immediately after removing concrete formwork while concrete is 'green').
 - o. Review layout plan, scheduling, coordination, and placement requirements of detectable warning panels.
 - p. Review concrete slab tolerances and corrective measures if tolerances not met.
 - q. Review safety issues.

- r. 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.

1.4 SUBMITTALS

- A. Action Submittals:
 - 1. Joint layout plan for control and expansion joints for sidewalks, curbs, and gutters for written approval before starting work on this Section.
 - 2. Detectable warning panels:
 - a. Layout plan and joints location for written approval before starting work on this Section.
 - 3. Shop Drawings:
 - a. Show dimensioned locations of anchor bolts for hold-down anchors and columns.
 - b. Show reinforcement and all necessary bending diagrams and reinforcing steel list, and construction joint locations.
 - c. Provide bar schedules and bending details.
 - d. Reinforced concrete walls shall be shown in scale elevation (scale at least one quarter inch to one foot). Details shall be in accordance with ACI rules.
 - e. Show all formwork for concrete surfaces which are to remain exposed in the finished work.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Installers:
 - 1) Certification for National Ready Mixed Concrete Association (NRMCA).
 - 2) Certification for ACI-certified Flatwork Finishers and Technicians.
 - 2. Design Data:
 - a. Mix Design:
 - 1) Furnish proposed mix design to Architect for review prior to commencement of Work.
 - a) Include density (unit weight) and void content determined per ASTM C1688/C1688M for fresh mixed properties and per ASTM C140/C140M for hardened concrete properties.
 - b) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use.
 - b. Ready-Mix Supplier:
 - 1) Require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job-site for use of Owner or his representatives. Tickets shall show following:
 - a) Name of ready-mix batch plant.
 - b) Serial number of ticket.
 - c) Date and truck number.
 - d) Name of Contractor.
 - e) Name and location of Project.
 - f) Specific class or designation of concrete conforming to that used in Contract Documents.
 - g) Amount of concrete.
 - h) Amount and type of cement.
 - i) Total water content allowed by mix design.
 - j) Amount of water added at plant.
 - k) Sizes and weights of sand and aggregate.
 - l) Time loaded.
 - m) Type, name, manufacturer, and amount of admixtures used.
 - n) Design Data.
 - 2) Provide certificates with supporting testing reports verifying compliance with Contract Document requirements and that materials provided are from single source for following:
 - a) Cement.
 - b) Aggregate.

- c) Fly Ash.
 - 3. Source Quality Control Submittals:
 - a. Concrete mix design: Submit mix designs to meet following requirements:
 - 1) Mix Type E:
 - a) For exterior concrete pavilion slab, sidewalks, aprons, foundations, exterior footings and other exterior concrete.
 - b) 4500 psi (31.03 MPa) 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) Mix Type F should be used for all exterior concrete exposed to freeze/thaw cycles and deicing salts, unless dictated otherwise by site conditions.
 - f) For concrete paving, use mix design based upon use of 1-1/2 inches (38 mm) coarse aggregate (about 15 percent).
 - 2) Air Entrainment: Six (6) percent, plus or minus 1-1/2 percent for exterior concrete and foundation walls exposed to freeze/thaw cycles.
 - 3) 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 (100 mm) slump maximum before addition of high range water reducer.
 - 2) 8 inch (200 mm) slump maximum with use of high range water reducer.
 - 3) Slump not required for Mix Type G.
 - 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.
- C. Closeout Submittals:
- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Pour Reports:
 - a) Provide report that records following information:
 - b) Date and time of start of pour, Date and time of end of pour, and Date and time of end of finishing procedures.
 - c) Temperature at start of pour, Temperature at end of Pour, and Maximum temperature during performance of finishing procedures.
 - d) Wind speed at start of pour, Wind speed at end of pour, and Maximum wind speed during performance of finishing procedures.
 - e) Humidity at start of pour, Humidity at end of pour, and High and low humidity during performance of finishing procedures.
 - f) Cloud cover at start of pour, Cloud cover at end of pour, and High and low cloud cover during performance of finishing procedures.
 - g) Screeding method and equipment used.
 - h) Saw cut method and equipment used.
 - 2) Testing and Inspection Reports:
 - a) Testing Agency Testing and Inspecting Reports of concrete.

1.5 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies, but is not limited to following:
 - 1. Installers and Installation Supervisor:
 - a. ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
 - 2. Ready-Mix Supplier:

- a. Comply with ASTM C94/C94M requirements and be certified according to NRMCA's 'Certification of Ready Mixed Concrete Production Facilities'.
3. Testing Agencies:
 - a. Independent agency qualified according to ASTM C1077 and ASTM E329.
 - 1) Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technicians, Grade I according to ACI CP-1 or equivalent certification program.
 - 2) Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be ACI-certified Concrete Laboratory Testing Technician - Grade II.
- B. Testing And Inspection:
 1. Owner 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'.

1.6 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 I.
 - a. Meet requirements of ASTM C595/C595M, Type IP.
 - b. Meet requirements of ASTM C1157/C1157M, Type GU.
 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.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
 - 3) Water Reducing Admixture:
 - a) Meet requirements of ASTM C494/C494M, Type A and containing not more than 0.05 percent chloride ions.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
 - 4) Water Reducing, Retarding Admixture:
 - a) Meet requirements of ASTM C494/C494M, Type D and contain not more than 0.05 percent chloride ions.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
 - 5) High Range Water Reducing Admixture (Superplasticizer):
 - a) Meet requirements of ASTM C494/C494M, Type F or G and containing not more than 0.05 percent chloride ions.
 - b) Type Two Acceptable Products:

- (1) Equal as approved by Architect before use. See Section 01 6200.
- 6) Non-Chloride, Non-Corrosive Accelerating Admixture:
 - a) Meet requirements of ASTM C494/C494M, Type C or E and containing not more than 0.05 percent chloride ions.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
- 7) Corrosion Inhibiting Admixture:
 - a) Liquid admixture to inhibit corrosion of steel reinforcement in concrete by introducing proper amount of anodic inhibitor. Admixture shall contain thirty (30) percent calcium nitrite solution and shall be used where called for in specifications or on drawings.
 - b) Type Two Acceptable Products:
 - (1) Eucon CIA by Euclid.
 - (2) DCI or DCI-S by GCP Applied Technologies.
 - (3) Equal as approved by Architect before use. See Section 01 6200.
- 8) Alkali-Silica Reactivity Inhibiting Admixture:
 - a) Specially formulated lithium nitrate admixture for prevention of alkali-silica reactivity (ASR) in concrete. Admixture must have test data indicating conformance to ASTM C1293.
 - b) Type Two Acceptable Products:
 - (1) Eucon Integral ARC by Euclid.
 - (2) RASIR by W R Grace.
 - (3) Equal as approved by Architect before use. See Section 01 6200.
- 9) Viscosity Modifying Admixture (VMA):
 - a) Liquid admixture used to optimize viscosity of Self-Consolidating Concrete (SCC). Subject to compliance with requirements, provide following at dosage rates per manufacturer's recommendation.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
- 10) Shrinkage Reducing Admixture (SRA):
 - a) Liquid admixture specifically designed to reduce drying shrinkage and potential for cracking.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
- 11) Rapid Drying Admixture in Interior Concrete Slabs on Grade:
 - a) Admixture specifically designed to promote rapid drying of concrete.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.

2.2 ACCESSORIES

A. Formwork:

1. Meet requirements specified in Section 03 1113:

B. Bonding Agents:

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

C. Expansion Joint Filler:

1. Expansion Joint Filler Material:
 - a. Design Criteria:

- 1) Resilient, flexible, non-extruding, expansion-contraction joint filler meeting requirements of ASTM D1751.
 - 2) **1/2 inch (12.7 mm)** thick.
 - 3) Resilience:
 - a) When compressed to half of original thickness, recover to minimum of seventy (70) percent of original thickness.
 - b. 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.
- D. Finishing Material (Exposed Vertical Faces of Foundation and Retaining Walls):
1. Finishing Material available in multiple concrete shades to closely match concrete surface.
 2. Type Two Acceptable Products:
 - a. Mixture of 1 part cement (using same cement as used in concrete foundations), 1 part sand with 95 percent passing #50 sieve.
 - b. RapidSet WunderFixx by CTS Cement Manufacturing Corporation, Cypress, CA www.rapidset.com.
 - c. Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
1. Concrete Forms:
 - a. Verify dimensions and spot elevations for locations of forms for concrete footings, stem walls, building slabs, curbs, gutters, walkways, and drainage systems are correct before concrete is placed.
 - 1) Notify Architect of incorrect dimensions or spot elevations in writing.
 - 2) Do not place concrete until corrections are made and verified.
 2. Detectable Warning Panels:
 - a. Examine substrate and verify substrate is suitable for installation of detectable warning panels:
 - 1) Notify Architect of unsuitable conditions in writing.
 - 2) Do not install detectable warning panels over unsuitable conditions.
 - 3) Commencement of Work by installer is considered acceptance of substrate.

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 (2 deg C)** minimum at time of concrete placement.
 - 3) Thaw sub-grade **6 inches (150 mm)** deep minimum before beginning concrete placement. If necessary, re-compact thawed material.
 - 4) Use no frozen materials or materials containing ice.
 - 5) 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 (32 deg C)** in hot weather.
 - 2) Cool aggregate and subgrades by sprinkling.
 - 3) Avoid cement over **140 deg F (60 deg C)**.
 - 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. Aggregate base and subgrade:
 - 1) Prepare aggregate base as specified in Section 31 1123.
 - 2) Prepare natural soil subgrade as specified in Section 31 2213.
 - 3) Prepare fill subgrade as specified in Section 31 2323.
 2. Concrete Slab Thickness:
 - a. Increase thickness of concrete beneath detectable warning panels **one inch (25 mm)**.
 3. Inserts, bolts, boxes, templates, pipes, conduits, and other accessories required by Divisions 22, 23, and 26 shall be installed and inspected before placing concrete.
 4. 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 (Consolidation not required in concrete around reinforcing bars with Mix Type G).
 - 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. Bear **12 inches (300 mm)** minimum into undisturbed earth or on mechanically compacted engineered fill. Step footings at ratio of 1-1/2 horizontal to One vertical unless detailed otherwise. Exterior wall footing shall bear 30 inches minimum below finish grades.
 - b. Level top of finish footing and leave rough.
 - c. Where joints are required, bulkhead, key horizontally, and dowel with two No. 5 reinforcing bars, **48 inches (1 200 mm)** long.
3. Foundation Walls: Leave steel projecting where required for floor tie.
4. Exterior Slabs:
- a. For continuous placing and where shown on Drawings, saw cut **one inch (25 mm)** deep control joints before shrinkage occurs (**2 inches at 6 inch slabs**) (**50 mm at 150 mm slabs**).
5. Miscellaneous Concrete Elements:
- a. Detectable Warning Panels:
 - 1) Follow Manufacturer's recommendations on following:
 - a) Temperature requirements.
 - b) Expansion and control joint requirements.
 - c) Installation of panels.
 - d) Curing of panels.
 - b. Equipment Bases: Coordinate with appropriate Sections for locations and dimensions.
 - c. Light Pole Bases, Mow Strips, and Aprons:
 - 1) Install bond breaker consisting of three (3) layers of **30 lb (13.6 kg)** roofing felt between pole base and adjoining sidewalk, mow strip and building foundations, and aprons and building foundations.
 - d. Mow Strips and Aprons:
 - 1) Aggregate base not necessary under mow strips and aprons.
 - 2) Form and cast mow strips in place.
 - 3) Set top of mow strip above finish grade as follows:
 - a) Sodded Areas: **2 inches (50 mm)** below.
 - b) Seeded Areas: **One inch (25 mm)** below.
 - c) Ground Cover Areas: **2 inches (50 mm)** below.
 - d) Trees and Shrub Areas (not individual trees): **4 inches (100 mm)** below.
 - 4) Compact topsoil underneath mow strips and aprons to density of undisturbed earth.
 - e. Pipe Bollards:
 - 1) Install plumb and fill with concrete.
 - f. Sidewalks, Exterior Stairs, And Landings:
 - 1) Slope with cross slope of **1/8 to 1/4 inch per ft (3 to 6 mm per 300 mm)** (one to two percent) in direction of intended drainage.
 - 2) Slope away from building **1/8 to 1/4 inch per ft (3 to 6 mm per 300 mm)** (one to two percent) minimum.
 - 3) 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) Control joints in Concrete Paving are specified in Section 32 1313.
 - 3) Depth of control joints shall be approximately one quarter of concrete slab thickness, but not less than **one inch (25 mm)**.
 - 4) Control joints to be hand tooled in sidewalks, curbs and gutters, mow strips, and aprons.
 - 5) Table One:

Concrete Control Joint On-Center Spacing (+/-)		
Sidewalks	4 feet to 6 feet	1.2 meters to 1.8 meters
Curbs and Gutters	10 feet	3.0 meters
Mow Strips	3 feet to 5 feet	0.90 meters to 1.50 meters
Flat Drainage Structures	10 feet	3 meters
Retaining Walls w/guardrails	Align with posts	
Retaining Walls w/chain link fencing	Align with posts	

b. Expansion Joints:

- 1) Expansion joints in Concrete Paving are specified in Section 32 1313.
- 2) Install so top of expansion joint material is 1/4 inch (6 mm) below finished surface of concrete.
- 3) No expansion joint required between curbs and sidewalks parallel to curb.
- 4) 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).
- 5) Provide expansion joints between sidewalks that are parallel, and adjacent, to storage building or main building.
- 6) 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.
- 7) Table Two:

Concrete Expansion Joint (Isolation) On-Center Spacing (+/-)		
Sidewalks, Curbs and Gutters	40 feet to 100 feet	12 meters to 30 meters
Mow Strips and Aprons	20 feet to 40 feet	6 meters to 12 meters
Flat Drainage Structures	50 feet	15 meters
Retaining Walls w/guardrails	36 feet	11 meters
Retaining Walls w/chain link fencing	50 feet	15 meters

- 8) Seal expansion joints as specified in Section 07 9213 for following areas:
 - a) Between entryway slabs and building foundations.
 - b) Between sidewalks and building foundations.
 - c) Within curbs and gutters.
 - d) Within flat drainage structures and at joints between flat drainage structures and other concrete elements.
 - 9) Expansion joints are not required to be sealed for following areas:
 - a) Within aprons and where apron abuts sidewalks.
 - b) Within mow strips and where mow strip abuts building foundation and sidewalks.
 - c) Within sidewalks.
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. Do not disturb bolts during finishing process.

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 (3 meter)** 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 (32 mm)**.
 - b) Provide rough hair finish where grades exceed 6 percent **1-1/4 inch (32 mm)**.
 - c) Broom finish, by drawing broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide fine line texture acceptable to Architect. At curb and gutter, apply broom finish longitudinal to curb and gutter flowline.
 - d) On inclined slab surfaces, provide coarse, non-slip finish by scoring surface with stiff-bristled broom, perpendicular to line of traffic. At curb and gutter, apply broom finish longitudinal to curb and gutter flowline.
 - e) Do not remove forms for twenty-four (24) hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.
 - f) Round edges exposed to public view to **1/2 inch (13 mm)** radius, including edges formed by expansion joints.
 - g) Remove edger marks.
 - b. Concrete Paving Finish is specified in Section 32 1313.
3. Vertical Surfaces (Exposed To View Vertical Surfaces, Exposed Retaining Walls, Exposed Foundation Walls, Concrete Piers, and etc.):
 - a. General:
 - 1) Finishing Material to fill and smooth interior and exterior concrete surface defects such as spalls, gouges, cracks, dents, chips, bug holes, stone pockets, honeycombs, voids and other defective areas.
 - 2) Chamfer lines shall be finished.
 - b. Surface Preparation:
 - 1) Formwork shall be stripped from concrete while concrete is still 'green'.
 - 2) Concrete surface to be finished immediately after formwork has been removed.
 - a) Immediately after removing forms, remove joints, marks, bellies, projections, loose materials and other irregularities, and cut back metal ties from surfaces to be exposed.
 - b) Repair defective areas and voids or stone pockets with Finishing Material and smooth to even surface matching surrounding undamaged area.
 - c. Smooth Rubbed Finish:
 - 1) Thoroughly wet with water, apply Finishing Material in thin layer, rub in circular motion to smooth uniform finish.
 - 2) Entire surface shall be protected from rapid drying for not less than three (3) days.
 - 3) Surfaces shall be cleaned of drip marks and discolorations.
 - 4) Concrete surface shall be left with clean, neat, uniform finish, free from form markings and shall be uniform in color and texture.

- 4. Light Pole Bases:
 - a. Exposed portion to have smooth rubbed finish as specified in Vertical Surfaces in previous paragraph.

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 (4.4 deg C).
 - 6) Apply uniformly without puddles or ponding.
 - 7) Do not apply before bleed water has dissipated.
 - 8) Do not apply over standing water.

D. 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:

Maximum Variation Tolerances		
Thickness, standard	plus 3/8 inch, minus 1/4 inch	plus 9.5 mm, minus 3 mm
Thickness, footings	minus 0 inch	minus 0 mm
Plan, 0 - 20 feet	1/2 inch	12.7 mm
Plan, 40 feet or greater	3/4 inch	19 mm
Plan, footings	plus 1/2 inch	plus 12.7 mm
Eccentricity, footings	2 inch maximum standard, 1/2 inch at masonry	50 mm maximum standard, 12.7 mm at masonry
Openings, size	minus 1/4 inch, plus one inch	minus 6 mm, plus 25.4 mm
Openings, location	plus / minus 1/2 inch at center	plus / minus 12.7 mm at center
Plumb	1/2 inch maximum	12.7 mm maximum
Consecutive Steps, treads	1/4 inch	6 mm
Consecutive Steps, risers	1/8 inch	3 mm
Flight of Stairs, treads	1/4 inch in total run	6 mm in total run
Flight of Stairs, risers	1/8 inch in total height	3 mm in total height

- 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.

3.4 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 (4 cu m), but less than 50 cu. yd (38 cu m), plus one (1) set for each additional 50 cu. yd (38 cu m) 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 (3.45 MPa).
 - 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.
 2. Detectable Warning Panels:
 - a. Clean panel(s) in accordance with Manufacturer's cleaning instruction.

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.
- C. Detectable Warning Panels:
1. Protect installed panels from damage and until completion of project.

2. Protect installed panels from traffic until desired concrete strength is achieved.

END OF SECTION

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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.

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 (2 deg C)** and **110 deg F (43 deg C)** (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 (4.4 deg C)**.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Membrane Concrete Curing:

1. Description:
 - a. Clear water-based, ready-to use membrane curing agent that cures freshly placed concrete, forming effective barrier against moisture loss from concrete surface.
2. Design Criteria:
 - a. Exterior Concrete:
 - 1) Dissipating or non-dissipating membrane curing agent.
 - b. Interior Concrete:
 - 1) Dissipating membrane curing agent only.
 - c. VOC-compliant compound.
 - d. Meet requirements of ASTM C309 and AASHTO M 148, Type 1 or 1-D, Class B.
 - e. Interior concrete: containing no mineral spirits, naphtha, or other components detrimental to finish flooring installation.
 - f. Maintain ninety-five (95) percent of mix water present in concrete mass after application.
 - g. 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 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 (do not use when 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.
 - 2) 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) 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 4800**PRECAST CONCRETE SPECIALTIES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
1. Salvage and modify existing precast concrete wall caps used at exterior mechanical enclosures as shown in Contract Documents.
- B. Related Requirements:
1. Section under 04 2000 heading: Installation of precast members.
 2. Section 04 0523: 'Masonry Accessories' for flashing under precast units and cast in place anchor straps.
 3. Section 04 2724: 'Cavity Wall Unit Masonry: Enclosure Walls' for installation of precast member for concrete wall cap at exterior mechanical enclosures.
 4. Section 07 9213: 'Elastomeric Joint Sealants'.

1.2 REFERENCES

- A. Reference Standards:
1. ASTM International:
 - a. ASTM A615/A615M-18, 'Standard Specification for Deformed and Plain Steel Bars for Concrete Reinforcement'.
 - b. ASTM A1064/A1064M-18a, 'Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete'.
 - c. ASTM C33/C33M-18, 'Standard Specification for Concrete Aggregates'.
 - d. ASTM C150/C150M-18, 'Standard Specification for Portland Cement'.
 - e. ASTM C260/C260M-10a(2016), 'Standard Specification for Air-Entraining Admixtures for Concrete'.
 2. ASTM International (following are referenced specifically for detectable warning panels):
 - a. ASTM C39/C39M-18, 'Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens'.
 - b. ASTM C140-18a, 'Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units'.
 - c. ASTM C293/C293M-16, 'Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading)'.
 - d. ASTM C418-12, 'Standard Test Method for Abrasion Resistance of Concrete by Sandblasting'.
 - e. ASTM C947-03(2016), 'Standard Test Method for Flexural Properties of Thin-Section Glass-Fiber-Reinforced Concrete (Using Simple Beam With Third-Point Loading)'.
 - f. ASTM C1262/C1262M-18, 'Standard Test Method for Evaluating the Freeze-Thaw Durability of Dry-Cast Segmental Retaining Wall Units and Related Concrete Units'.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
1. Store material on planks clear of ground and protect from damage.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Materials:

1. Salvage and modify existing precast concrete caps from masonry enclosure walls.

2.2 ACCESSORIES

- A. Sealant: As specified in Section 07 9213: 'Elastomeric Joint Sealants'.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Concrete wall caps.

1. Install at exterior mechanical enclosures.
2. Coordinate all locations as described in Construction Documents.

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 securing anchor bolts and hardware in concrete.
 - b. For securing anchor bolts and hardware in masonry.
- B. Related Requirements:
 - 1. Section 04 0516: 'Masonry Grouting'.

1.2 REFERENCES

- A. Association Publications:
 - 1. American Concrete Institute:
 - a. ACI 305R-10, 'Guide to Hot Weather Concreting'.
 - b. ACI 306R-10, 'Guide to Cold Weather Concreting'.
 - c. ACI 351.1R-12, 'Grouting Between Foundations and Bases for Support of Equipment and Machinery'.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C1107/C1107M-14a, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).'
 - 2. United States Army Corps of Engineers (USACE):
 - a. CRD C-621-93, 'Handbook for Concrete and Cement Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink)'.

1.3 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.

1.4 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.
- B. Storage And Handling Requirements:
 - 1. Follow Manufacturer's recommendations including but not limited to following:
 - a. Store in clean, dry location.
 - b. Keep containers sealed until ready for use.
 - c. Store materials at room temperature before use.

2. Protect materials during handling and placement to prevent damage or contamination.
 - a. Protect materials from freezing or overheating.
3. Shelf Life: One (1) year minimum in original, unopened containers.

1.5 FIELD CONDITIONS

- A. Ambient Conditions:
 1. General:
 - a. Do not place grout over frozen concrete.
 2. Maintain environmental conditions and protect Work during and after installation to comply with referenced standards and Manufacturer's printed recommendations:
 - a. Do not install products under environmental conditions outside Manufacturer's recommendations.
 3. Follow ACI requirements for cold and hot weather concreting or Manufacturer's written instructions, whichever is more stringent:
 - a. Cold Weather Limitations:
 - 1) Follow requirements of ACI 306R for cold weather concreting.
 - b. Hot Weather Limitations:
 - 1) Follow requirements of ACI 305R for hot weather concreting.
 - c. ACI 305R-10, 'Guide to Hot Weather Concreting'.
 - d. ACI 306R-10, 'Guide to Cold Weather Concreting'.

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 (41 MPa)** 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.fivestarprouducts.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 (27.6 MPa) 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 (27.58 MPa) is reached.
- C. Protect placed grout from damage during construction.

END OF SECTION

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 0521 MASONRY VENEER TIES
- 04 0523 MASONRY ACCESSORIES

04 2000 UNIT MASONRY

- 04 2113 BRICK VENEER UNIT MASONRY
- 04 2724 CAVITY WALL UNIT MASONRY: ENCLOSURE WALLS

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.
 - e. Testing and Inspection for providing specific testing and inspections and Field Tests and Inspections administrative requirements for masonry.
- B. Related Requirements:
1. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
 2. Section 01 4523: 'Testing And Inspection Services' for testing, inspections, special testing, special inspections, and testing laboratory services for materials, products, and construction methods.
 3. Section 07 9213: 'Elastomeric Joint Sealants' used with masonry joints.
 4. 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 2114: 'Brick Veneer Unit Masonry'.
 - 5) Section 04 2724: 'Cavity Wall Unit Masonry: Enclosure Walls'.

1.2 REFERENCES

- A. Association Publications:
1. The Brick Industry Association, Reston VA: 'Technical Notes on Brick Construction' (July 2012), www.gobrick.com.
- B. Definitions:
1. Brick:
 - a. Cavity Wall Masonry: Wall consisting of two wythes of masonry in which space between wythes is not grouted.
 - b. Hollow Brick: Masonry unit of clay or shale whose net cross-sectional area in any plane parallel to bearing surface is not less than 60 percent of its gross cross-sectional area measured in same plane (See ASTM C652).
 - c. Solid Brick: Solid masonry unit of clay or shale, usually formed into rectangular prism while plastic and burned or fired in a kiln. Solid brick can have core holes whose area is no more than twenty-five 25 percent of total bed surface of the brick.
 - d. Running Bond: Same as common bond, with continuous horizontal joints, but vertical joints are offset or in line. Bricks of each course are offset from the previous instead of being right on top of each other. If running bond is being used with modular brick, end of brick will be at mid-point of brick on course below. Running bond only requires minimal cutting at each end and will easily follow a gentle curve. Running bond method, most used.
 - e. Unit Masonry: as referred to in this specification is defined as Brick Veneer, Hollow Brick, Architectural Concrete, Composite, and Cavity Wall.

- f. Warpage: Distortion of surfaces or edges of an individual brick from a plane surface or from straight line.
 - g. Wythe: Continuous vertical section of masonry one (1) unit in thickness.
2. Brick Classifications:
- a. Brick Color:
 - 1) No color-related tolerances in ASTM standards for brick. Standards are dictated by sample panel, mockups, or project specification.
 - b. Brick Grade (durability and exposure):
 - 1) Brick is subjected to environmental and service conditions that vary. Brick is specified for its specific durability based on severity of weather and exposure and physical properties. Brick grades classifications are based on Weathering Index:
 - a) Grade SW: Severe weathering (stronger and more durable, and require less maintenance).
 - b) Grade MW: Moderate weathering (less durable).
 - c) Grade NW: Negligible or no weathering (least durable and should only be used for interior work).
 - c. Brick Types:
 - 1) Type FBX:
 - a) Brick for general use in masonry where higher degree of precision and lower permissible variation in size than permitted for Type FBS.
 - b) Maintains strict requirements on absorption, waste, chipping, cracks, dimensions and distortion (warpage).
 - c) Allows very narrow color range, minimal size variations, and uniform in appearance.
 - 2) Type FBS:
 - a) Brick for general use in masonry:
 - b) Wider range of color and size variations, but lack of production controls results in many odd color lots.
 - 3) Type FBA:
 - a) Brick for general use in masonry selected to produce characteristic architectural effects resulting from non-uniformity in size and texture of individual units:
 - b) Used for aesthetic qualities.
 - c) Has no limits for size and color variations.
3. Cold Weather: as referred to in this Section, is four (4) hours with ambient temperature below **40 deg F (4.4 deg C)** in twenty-four (24) hour period.
4. Efflorescence: Deposit or encrustation of soluble salts, generally white and most commonly consisting of calcium sulfate that may form on surface of stone, brick, concrete, or mortar when moisture moves through and evaporates on masonry. Often caused by free alkalis leached from mortar, grout, adjacent concrete, or in clays. Test for efflorescence is described in ASTM C67 and CAN/CSA A82.
5. Flashing:
- a. Cavity Wall Flashing: Same as flexible flashing.
 - b. Flashing: Thin impervious material placed in mortar joints and through air spaces in masonry to prevent water penetration and/or provide water drainage.
 - c. Flexible Flashing: Water-proof material typically used in cavity wall construction to contain and assist in proper water drainage that may penetrate wall system veneer. Other materials may be required to constitute the system.
 - d. Foundation Flashing: Same as flexible flashing.
 - e. Head And Sill Flashing: Same as flexible flashing.
 - f. Through-Wall Flashing: Generally considered same as flexible flashing.
6. Hot Weather: as referred to in this Section, is ambient air temperature above **100 deg F (38 deg C)** or ambient air temperature above **90 deg F (32 deg C)** with wind velocity **8 mph (13 kph)** or greater.
7. Masonry Joints:
- a. Masonry Control Joint: Determines location of movement in concrete masonry walls that is due to volume changes resulting from shrinkage. Vertical control joint is vertical gap through concrete masonry wythe and filled with inelastic materials. Joint backing with sealant is used on exterior side of control joint to prevent water and air penetration. Concrete masonry generally shrinks over time.

- b. Masonry Expansion Joint. Expansion joint separates brick masonry walls into segments to prevent cracking caused by changes in temperature, moisture expansion, elastic deformation, settlement and creep. Joints are formed by leaving continuous unobstructed opening through brick wythe that may be filled with highly compressible material. Joint backing with sealant is used on exterior side of expansion joint to prevent water and air penetration. Brick masonry generally expands over time.
8. Vents:
- a. Weep Hole: Opening placed in mortar joints of facing material at level of flashing, to permit escape of moisture.
 - b. Weep Vent: Inserts placed in Weep Hole to screen insects from entering but allowing escape of moisture.
 - c. Vents (Open Head Joints): Placed at top of drainage air space to help reduce moisture buildup in air space by promoting ventilation. Weep vents may be placed vents to screen insects from entering but allowing movement of air through weep holes.
- C. Reference Standards:
1. ASTM International:
 - a. ASTM D2000-12, 'Standard Classification for Rubber Products in Automotive Applications'.
 - b. ASTM D2240-15, 'Standard Test Method for Rubber Property-Durometer Hardness'.
 - c. ASTM D2287-12, 'Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds'.
 2. International Building Code (IBC) (2015 or latest approved edition):
 - a. 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'.
 - b. Chapter 21, 'Masonry' for materials, design, construction and quality of masonry.
 3. Masonry Standards Joint Committee (MSJC) - The Masonry Society (TMS) / American Concrete Institute (ACI) / American Society of Civil Engineers (SEI/ASCE):
 - a. Building Code Requirements and Specification for Masonry Structures:
 - 1) TMS 402-13/ACI 530-13/ASCE 5-13 'Building Code Requirements for Masonry Structures'.
 - 2) TMS 602-13/ACI 530.1-13/ASCE 6-13, 'Specification for Masonry Structures'.

1.3 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.
 - c. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections.
 - 1) Review requirements and frequency of testing and inspections.
 - 2) Review specific testing and inspections and field test requirements as specified in Unit Masonry Sections.
- C. Scheduling:
1. Brick Unit Veneer Masonry:
 - a. Structural Mortar:

- 1) Notify Testing Agency and Architect twenty-four (24) hours minimum before placing masonry units, reinforcing, mortar and/or grout.
2. Concrete Unit Masonry:
 - a. Structural Mortar and Grout:
 - 1) Notify Testing Agency and Architect twenty-four (24) hours minimum before placing masonry units, reinforcing, mortar and/or grout.

1.4 SUBMITTALS

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

1.5 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 structural masonry (prisms, units, mortar, and grout):
 - a. Owner will employ testing agencies to perform testing and inspection for structural masonry as specified in Field Quality Control in Part 3 of this specification:
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
 - 2) See Section 01 1200: 'Multiple Contract Summary'.
- B. Scheduling:
 1. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing mortar.
 2. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing grout.

1.6 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.

1.7 FIELD CONDITIONS

A. Ambient Conditions:

1. Mortar:
 - a. Ideal mortar temperature is **70 deg F ± 10 deg F (21 deg C ± 6 deg C)**. Mixing temperature should be maintained within **10 deg F (6 deg C)**.
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 (minus 7 deg C)** 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 (60 deg C)**. 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 (37.8 deg C)**, or exceeds **90 deg F (32.2 deg C)** with wind velocity greater than **8 mph (12.9 kph)**.
 - 2) Ambient temperature exceeds **115 deg F (46.1 deg C)**, or exceeds **105 deg F (40.6 deg C)** with wind velocity greater than **8 mph (12.9 kph)**.
 - 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

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Unit Masonry:
 - a. Tests and Inspections are required as specified in Sections under Heading 04 2000 'Unit Masonry'.
2. Stone Assemblies:
 - a. Inspections are NOT required as specified in Section 04 4300.
3. Cast Stone Masonry:
 - a. Inspections are required as specified in Section 04 7213:

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.
 - 2. Custom matching color of existing brick veneer mortar.
- 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 REFERENCES

- A. Definitions:
 - 1. See Section 04 0501: 'Common Masonry Requirements' for common masonry definitions.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C144-11, 'Standard Specification for Aggregate for Masonry Mortar'.
 - b. ASTM C150/C150M-16, 'Standard Specification for Portland Cement'.
 - c. ASTM C207-06(2011), 'Standard Specification for Hydrated Lime for Masonry Purposes'.
 - d. ASTM C270-14a, 'Standard Specification for Mortar for Unit Masonry'.

1.3 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'.

1.4 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.

1.5 QUALITY ASSURANCE

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

1.6 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 N: **750 psi (5 171 kPa)**.
 - 1) Brick Veneer Unit Masonry.
 - b. Type S: **1800 psi (12.4 MPa)**.
 - 1) Cavity Wall Unit Masonry.
 - 2) Concrete Unit Masonry (CMU)
 - 3. Color: Custom match as required to match existing brick veneer mortar color.
- 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.
 - 6. Mortar Color Pigment:
 - a. High purity, chemically inert, unfading, alkali-fast mineral oxides, finely ground and especially prepared for mortar.
 - b. Color Standard: As selected by Architect to match existing brick veneer mortar color.
 - c. Type One Acceptable Products:
 - 1) True Tone Mortar Colors by Davis Colors, Los Angeles, CA www.daviscolors.com.
 - 2) SGS Mortar Colors by Solomon Colors, Springfield, IL www.solomoncolors.com.
 - 3) Equal as approved by Architect before bidding. See Section 01 6200.

- C. Mixes:
 - 1. General:
 - a. Heat water and sand to 140 deg F (60 deg C) maximum if temperature is below 40 deg F (4.4 deg C).
 - 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

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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 REFERENCES

- A. Definitions:
 - 1. See Section 04 0501 for common masonry definitions.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C143/C143M-15a, 'Standard Test Method for Slump of Hydraulic-Cement Concrete'.
 - b. ASTM C404-11, 'Standard Specification for Aggregates for Masonry Grout'.
 - c. ASTM C476-16, 'Standard Specification for Grout for Masonry'.
 - d. ASTM C1019-16, 'Standard Test Method for Sampling and Testing Grout'.

1.3 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.

1.4 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.

1.5 QUALITY ASSURANCE

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

1.6 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 (200 to 280 mm)** as determined by Test Method ASTM C143/C143M and shall have minimum compressive strength of **2000 psi (14 MPa)** 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

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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 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
 - 2. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - 3. 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.
 - 4. Section 04 0501: 'Common Masonry Requirements' for installation of masonry anchors and inserts.
 - 5. Section 04 0521: 'Masonry Veneer Ties'.
 - 6. Section 04 0523: 'Masonry Accessories'.
 - 7. Sections Under 04 2000 Heading: 'Unit Masonry' for masonry anchors and inserts used in Unit Masonry.

1.2 REFERENCES

- A. Reference Standards:
 - 1. American Concrete Institute:
 - a. ACI 355.4-11, 'Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary'.
 - b. ACI 355.4M-11, 'Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary (Metric)'.
 - c. ACI 548.12-12, 'Specification for Bonding Hardened Concrete and Steel to Hardened Concrete with an Epoxy Adhesive'.
 - 2. ASTM International:
 - a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.
 - b. ASTM A307-14, 'Standard Specification for Carbon Steel Bolts and Studs, 60000 psi Tensile Strength'.
 - c. ASTM A563-15, 'Standard Specification for Carbon and Alloy Steel Nuts'.
 - d. ASTM E488/E488M-15, 'Standard Test Methods for Strength of Anchors in Concrete Elements'.
 - e. ASTM F3125/F3125-15a, 'Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions'.
 - 3. International Code Council (IBC) (2015 or latest edition available):
 - a. Chapter 17, 'Special Inspections And Tests':
 - 1) Section 1704, 'Special Inspections And Tests, Contractor Responsibility And Structural Observations'.

1.3 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.

1.4 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.

1.5 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'.

1.6 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 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 (50 mm)** minimum conforming to material requirements of ASTM A36/A36M.
 - b) Anchor hook to project **2 inch (50 mm)** minimum including bolt diameter.
 - 2) Headed Bolts:
 - a) Headed type threaded **2 inch (50 mm)** 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 (50 mm)** 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 (6.4 mm)** 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 (6.4 mm)** 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 (6.4 mm)** when using fine grout and at least **1/2 inch (12.7 mm)** 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 (12.7 mm)** 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 (25 mm)**.
- 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 REFERENCES

- A. Reference Standards:
 - 1. ACI 117-10(R2015): 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
- B. Definitions:
 - 1. See Section 04 0501 for common masonry definitions.
- C. Reference Standards:
 - 1. ASTM International:
 - a. ASTM A153/A153M-16, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
 - b. ASTM A615/A615M-16, 'Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement'.
 - c. ASTM A951/A951M-16, 'Standard Specification for Steel Wire for Masonry Joint Reinforcement'.
 - d. ASTM A1064/A1064M-16b, 'Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete'.
 - 2. CSA Group (Canadian Standards Association):
 - a. CSA G30.18-09 (2014), 'Carbon Steel Bars for Concrete Reinforcement'.

1.3 SUBMITTALS

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

1.4 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 (50 mm)** less than nominal thickness of wall.
- 3) Rod Size:
 - a) Side rods: **9 gauge (1.48 inch or 3.7 mm)** or **3/16 inch (4.76 mm)** diameter.
 - b) Cross rods: **9 gauge (1.48 inch or 3.7 mm)** or **3/16 inch (4.76 mm)** 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 (458 g/m²)** 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 (64 mm), 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 (64 mm), 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 (1.48 inch or 3.7 mm).
 - d. Finish: Hot-dipped galvanized as per ASTM A153/A153M (1.5 oz/ft (42.5 grams/305 mm)).
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 (6.4 mm)** for fine grout and **1/2 inch (12.7 mm)** for coarse grout.
 - d. Place reinforcing bars maintaining the following minimum cover:
 - 1) Masonry face exposed to earth or weather:
 - a) **2 inch (50.8 mm)** for bars larger than No. 5 (M #16).
 - b) **1-1/2 inch (38.1 mm)** for No. 5 (M #16) bars or smaller.
 - e. Maintain minimum clear distance between parallel bars of the nominal bar size or **1 inch (25.4 mm)**, 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 (38.1 mm)**, 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 (200 mm)**.
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 (203 mm)** from base of masonry, provide joint reinforcing **16 inches (400 mm)** on center vertically, except **8 inch (203 mm)** 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 (12.7 mm)** when not exposed to weather or earth; or **5/8 inch (15.9 mm)** when exposed to weather or earth.
 - c. Provide minimum **6 inch (150 mm)** 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 (12.7 mm)** when:
 - 1) Distance from centerline of reinforcing bars to opposite face of masonry is equal to **8 inch (203 mm)** or less.
 - 2) \pm **1 inch (25.4 mm)** for centerline of reinforcing bars to opposite face of masonry equal to **24 inch (610 mm)** or less but greater than **8 inch (203 mm)**.
 - 3) \pm **1-1/4 inch (32 mm)** for centerline of reinforcing bars to opposite face of masonry greater than **24 inch (610 mm)**.
 - b. Place vertical bar within:
 - 1) **2 inch (50.8 mm)** of required location along length of wall when wall segment length exceeds **24 inch (610 mm)**.
 - 2) **1 inch (25 mm)** of required location along length of wall when wall segment length does not exceed **24 inch (610 mm)**.
 - 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 (25 mm)** horizontally for every **6 inch (150 mm)** of vertical height.

3.2 CLEANING

A. Waste Management:

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

END OF SECTION

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SECTION 04 0521**MASONRY VENEER TIES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Ties for attaching brick veneer to framed walls.
 - 2. Joint reinforcing to attach veneer to Concrete Masonry Units (CMU).
- B. Related Requirements:
 - 1. Section 04 0501: 'Common Masonry Requirements' for installation of anchor and tie system.
 - 2. Section 04 0520: 'Masonry Reinforcing' for quality of seismic masonry reinforcing.
 - 3. Sections Under 04 2000 Heading: 'Unit Masonry' for installation of masonry units using anchor and tie system.

1.2 REFERENCES

- A. Reference Standards:
 - 1. ASTM International:
 - a. ASTM A153/A153M-16, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
 - b. ASTM A1008/A1008M-15, 'Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable'.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's product literature or cut sheet for each item showing compliance with design criteria requirements as specified.
- B. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. Manufacturer's published test results showing performance characteristics.
 - 2. Manufacturer's Instructions:
 - a. Manufacturer's published installation instructions for each item.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Manufacturers:
 - 1. Manufacturer Contact Information:
 - a. Heckman Building Products Inc, Melrose Park, IL www.heckmannbuildingprods.com.
 - b. Hohmann & Barnard, Hauppauge, NY www.h-b.com.
 - c. Wire-Bond by Masonry Reinforcing Corporation of America, Charlotte, NC www.wirebond.com.
- B. Design Criteria:

1. Seismic Anchors:
 - a. Seismic anchors for Seismic Design Categories A, B, C, D, E, and F.
 - b. Comply with seismic requirements for continuous wire in veneer to be integral component of anchor system.
 2. Wire (Carbon Steel):
 - a. As specified in Section 04 0520.
- C. Brick Veneer Unit Masonry Attached to Framing:
1. Brick Ties:
 - a. Design Criteria:
 - 1) Sheet Metal (Carbon Steel):
 - a) Meet requirements of ASTM A1008/A1008M.
 - b) Provide seismic notch to accommodate 9 ga (3.8 mm) or 3/16 inch (4.8 mm) diameter continuous wire
 - c) Thickness: 14 ga (1.9939 mm).
 - 2) Finish: Hot dipped galvanized (ASTM A153/A153M, Class B-2).
 - 3) Tie Length: Length includes cavity air space and 1-1/2 inches (38 mm) brick overlap as per code.
 - b. Type Two Acceptable Products:
 - 1) 360 L-Type Seismic Anchor by Heckmann.
 - 2) 345 SV Seismic-Notch Veneer Anchor by Hohmann & Barnard.
 - 3) 2522 Seismic Veneer Anchor by Wire-Bond.
 - 4) Equals meeting Design Criteria as approved by Architect before installation. See Section 01 6200.
- D. Dovetail Anchor And Slot:
1. Design Criteria:
 - a. Finish:
 - 1) Hot-dipped galvanized as per ASTM A153/A153M (1.5 oz/ft² (458 g/m²)).
 2. Dovetail Anchor:
 - a. Type Two Acceptable Products. See Section 01 6200:
 - 1) 303-SV Corrugated Notch by Hohmann & Barnard.
 - 2) 2222 Dovetail Anchor Seismic by Wire-Bond.
 - 3) Equals meeting Design Criteria as approved by Architect before installation. See Section 01 6200.
 3. Dovetail Slot:
 - a. Type Two Acceptable Products. See Section 01 6200:
 - 1) 305 Dovetail Slot by Hohmann & Barnard.
 - 2) 1304 Dovetail Slot by Wire-Bond.
 - 3) Equals meeting Design Criteria as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 04 0523**MASONRY ACCESSORIES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Drip edge/plate.
 - 2. Flexible flashing for brick sills.
 - 3. Flexible flashing for bottom of masonry veneer.
 - 4. Mortar guard.
 - 5. Precast concrete wall cap flashing.
 - 6. Termination bar.
 - 7. Weep vents.
 - 8. Vents (open head joints).

- B. Related Requirements:
 - 1. Section 04 0501: 'Common Masonry Requirements' for installation of masonry accessories.
 - 2. Section 04 0519: 'Masonry Anchors And Inserts'.
 - 3. Section 04 0521: 'Masonry Veneer Ties'.
 - 4. Sections Under 04 2000 Heading: 'Unit Masonry' for masonry accessories used in unit masonry.

1.2 REFERENCES

- A. Definitions:
 - 1. See Section 04 0501 for common masonry definitions.

- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM A153/A153M-16, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
 - b. ASTM A240/A240M-16, 'Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications'.
 - c. ASTM A580/A580M-15, 'Standard Specification for Stainless Steel Wire'.
 - d. ASTM D903-98(2010), 'Standard Test Method for Peel or Stripping Strength of Adhesive Bonds'.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's product literature or cut sheet for each item showing compliance with design criteria requirements as specified.

- B. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. Manufacturer's published test results showing performance characteristics.
 - 2. Manufacturer's Instructions:
 - a. 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. Warranty Documentation:

- 1) Final, executed copy of Warranty.
- b. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's product literature for each item.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 1. See submittal requirements as specified in Section 04 0501.
- B. Storage And Handling Requirements:
 1. See submittal requirements as specified in Section 04 0501.

1.5 WARRANTY

- A. Manufacturer's Standard Warranty for products provided.

PART 2 - PRODUCTS

2.1 ACCESSORIES

- A. Manufacturers:
 1. Manufacturer Contact List:
 - a. Advanced Building Products Inc, Springvale, ME www.advancedflashing.com.
 - b. Hohmann & Barnard, Haupaage, NY www.h-b.com.
 - c. Mortar Net USA Ltd, Burns Harbor, IN www.mortarnet.com.
 - d. Sandell Manufacturing, Schenectady, NY www.sandellmfg.com.
 - e. Wire-Bond, Charlotte, NC www.wirebond.com.
 - f. York Manufacturing Inc, Sanford, ME www.yorkflashings.com.
- B. Materials:
 1. Flexible Flashing:
 - a. Design Criteria:
 - 1) General:
 - a) Compatible with sealants and other building components.
 - b) Do not use as an exposed flashing.
 - c) Drool: Membrane shall not 'drool' when exposed to UV or heat.
 - 2) Required Components:
 - a) Drip Edge/Plate: Install with stainless steel drip edge/plate.
 - b) Mortar Guard: Install with mortar guard.
 - c) Termination Bar: Install termination bar.
 - d) Weep Vents: Requires weep vents.
 - 3) Self-adhering and self-sealing membranes:
 - a) Ambient Conditions: Follow Manufacturer recommendations for storage and application.
 - b) Do not apply to moist or damp surfaces.
 - c) Meet testing requirements of ASTM D903 for peel or stripping strength of adhesive bonds.
 - b. Asphalt-Free Copper Flashing:
 - 1) Description:
 - a) Non-asphaltic laminated flashing.
 - b) Copper bonded laminated with a non-asphaltic adhesive compound.
 - c) Size: **5 ounces (142 grams)** copper per **one sq ft (0.093 on sq m)** of material.
 - 2) Type One Acceptable Products:
 - a) Cop-R-Kraft Duplex by Advanced Building Products.

- b) Copper-Tuff by Hohmann & Barnard.
 - c) Cop-R-TEX Duplex (for coping, door and window heads, roof flashing, curtain wall and flashing between new and old walls) by York.
 - d) Multi-Flash 500 by York.
 - e) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.
- c. Asphalt-Free Non-Copper Flashing:
- 1) Description:
 - a) Self-adhering and self-sealing composite non-asphaltic waterproof polyethylene membrane.
 - 2) Design Criteria:
 - a) Self-adhering and self-sealing.
 - b) Width: Provide **18 inches (450 mm)** minimum width.
 - 3) Type One Acceptable Products:
 - a) Aquaflash Premium by Wire-Bond.
 - b) Flex-Flash Flashing by Hohmann & Barnard.
 - c) Textroflash Flashing by Hohmann & Barnard.
 - d) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.
- d. Preassembled Systems:
- 1) Description:
 - a) Pre-assembled panels consist of flashing membrane, drainage mat with integrated weep tabs, termination bar, drip edge, inside/outside corner boots, and end dams for a complete system.
 - 2) Type One Acceptable Product:
 - a) Total Flash by Mortar Net.
 - b) Flash-Vent by York.
 - c) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.
2. Components:
- a. Drip Edge/Plate:
- 1) Design Criteria:
 - a) **26 ga (0.019) (0.4826 mm)** stainless steel AISI Type 304 drip edge/plate flashing with drip edge hemmed back.
 - 2) Type One Acceptable Products:
 - a) No. 1007 Hemmed Drip-Edge Flashing by Heckmann.
 - b) Drip Plate by Hohmann & Barnard.
 - c) Sandell's Drip Edge by Sandell Construction Solutions.
 - d) No. 4156 Drip Edge Flashing by Wire-Bond.
 - e) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.
- b. Mortar Guard:
- 1) Description:
 - a) Allows passage of moisture from cavity to building exterior while restricting ingress of insects and other debris.
 - 2) Design Criteria:
 - a) Allows moisture to quickly and easily exit the cavity.
 - b) Allows for proper air movement in and out of the cavity.
 - c) Will not oxidize, rot, promote mold or fungus growth, or react with common building materials.
 - 3) Dimensions:
 - a) Thickness as recommended by Manufacturer for air space.
 - 4) Category Four Approved Products. See Section 01 6200 for definition of Categories.
 - a) Mortar Trap by Hohmann & Barnard.
 - b) Mortar Net by Mortar Net.
- c. Termination Bar:
- 1) Design Criteria:
 - a) Rigid PVC or stainless steel bar with sealant catch lip.
 - 2) Class Two Quality Standard:

- a) Equal meeting Design Criteria as approved by Architect before installation. See Section 01 6200.
 - d. Weep Vents:
 - 1) Description:
 - a) Allows passage of moisture from cavity to building exterior while restricting ingress of insects and other debris.
 - b) Dimensions:
 - (1) 3/8 inch (9.5 mm) wide x 2-1/2 inch (64 mm) deep x 3-3/8 inch (86 mm) long.
 - 2) Design Criteria:
 - a) Polypropylene tested to conform to ASTM standards.
 - b) Suitable for top of wall venting.
 - 3) Type One Acceptable Products:
 - a) Cell Vent:
 - (1) QV - Quadro-Vent by Hohmann & Barnard.
 - (2) No. 3601 Cell Vent by Wire-Bond.
 - b) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.
 - e. Vents (Open Head Joints):
 - 1) Description:
 - a) Vent inserted in weep hole at top of drainage air space in full height masonry veneer walls (not required in veneer wainscot walls or if air space vents into structure/roof above wall).
 - b) Vent allows passage of moisture from cavity to building exterior while restricting ingress of insects and other debris.
 - c) Dimensions:
 - (1) 3/8 inch (9.5 mm) wide x 2-1/2 inch (64 mm) deep x 3-3/8 inch (86 mm) long.
 - 2) Design Criteria:
 - a) Polypropylene tested to conform to ASTM standards.
 - b) Suitable for top of wall venting.
 - 3) Type One Acceptable Products:
 - a) Cell Vent:
 - (1) QV - Quadro-Vent by Hohmann & Barnard.
 - (2) No. 3601 Cell Vent by Wire-Bond.
 - b) Equal meeting Design Criteria as approved by Architect before bidding. See Section 01 6200.
- 3. Precast Concrete Wall Cap Flashing:
 - a. Description:
 - 1) Prevent entry of water into top of masonry wall located under precast concrete cap.
 - b. Design Criteria:
 - 1) 26 ga (0.019) (0.4826 mm) stainless steel AISI Type 304 drip edge/plate flashing with drip edge hemmed back.
 - 2) Apply sealant and backing rod.
 - c. Type One Acceptable Products:
 - 1) No. 1007 Hemmed Drip-Edge Flashing by Heckmann.
 - 2) Drip Plate by Hohmann & Barnard.
 - 3) Sandell's Drip Edge by Sandell Construction Solutions.
 - 4) No. 4156 Drip Edge Flashing by Wire-Bond.
 - 5) Equal meeting Design Criteria as approved by Architect.

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

SECTION 04 2113**BRICK VENEER UNIT MASONRY****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install masonry units as veneer on framing as described in Contract Documents.

- B. Products Installed But Not Furnished Under This Section:
 - 1. Masonry Accessories:
 - a. Drip edge/plate.
 - b. Flexible flashing for brick sills.
 - c. Flexible flashing for bottom of masonry veneer.
 - d. Mortar guard.
 - e. Termination bar.
 - f. Weep vents.
 - 2. Masonry Veneer Ties.
 - 3. Metal Lintels.

- C. Related Requirements:
 - 1. Sections Under 04 0000 Heading: 'Masonry':
 - a. Pre-installation conference held jointly with other masonry related sections.
 - 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 0521: 'Masonry Veneer Ties' for quality of masonry veneer ties.
 - 5. Section 04 0523: 'Masonry Accessories' for furnishing drip edge/plate, flexible flashing, mortar guard, termination bars and weep vents.
 - 6. Section 05 1223: 'Structural Steel Buildings' for metal lintels.
 - 7. Section 07 9213: 'Elastomeric Joint Sealants'.
 - 8. Section 10 1424: 'Engraved Stone Panel Signage.'

1.2 REFERENCES

- A. Definitions:
 - 1. Section 04 0501: 'Common Masonry Requirements' for:
 - a. Common Masonry Terms.
 - b. Brick and Brick Classifications.

- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C67-14, 'Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile'.
 - b. ASTM C216-16, 'Standard Specification for Facing Brick (Solid Masonry Made from Clay or Shale)'.
 - 2. Masonry Standards Joint Committee (MSJC) - The Masonry Society (TMS) / American Concrete Institute (ACI) / American Society of Civil Engineers (SEI/ASCE):
 - a. TMS 402-13/ACI 530-13/ASCE 5-13 and TMS 602-13/ACI 530.1-13/ASCE 6-13, 'Building Code Requirements and Specification for Masonry Structures'.

1.3 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.
 - a. Schedule pre-installation conference during construction of mockup panel.

1.4 SUBMITTALS

- A. Action Submittals:
 - 1. Samples:
 - a. One (1) full size brick minimum, one (1) sample of each special shape, and physical samples which demonstrate full range of color and texture.
 - b. Type of veneer tie used.
- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Manufacturers Documentation:
 - a) Brick Manufacturer's literature or cut sheet.
 - b) Brick color and type selection.
 - 2) Testing and Inspection Reports:
 - a) Testing Agency Testing and Inspecting Reports.

1.5 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'.

1.6 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'.

1.7 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. Face Brick: Meet requirements of ASTM C216 or CSA A82.
 - a. Brick Grade SW.
 - b. Brick Type: FBX.
 - c. Efflorescence:
 - 1) Provide brick that has been tested according to ASTM C67 and is rated 'Not Effloresced'.
 - d. Initial rate of absorption: Less than **30 sq. in (30 g)** per minute when tested per ASTM C67.
 - e. Brick shall be free of defects, deficiencies, and surface treatments, including coatings that would interfere with proper setting of brick or significantly impair strength or performance of Work.
 - f. Face or faces that will be exposed in place shall be free of chips that exceed limits set in ASTM C216 of five (5) percent for FBX. Aggregate length of chips shall not exceed ten (10) percent.
 - g. Other than chips, face or faces shall be free of cracks or other imperfections detracting from appearance of designated sample when viewed from distance of **15 feet (4.6 meters)** away. Number of brick in delivery that are broken or otherwise fail to meet requirements for chippage and tolerances shall not exceed five (5) percent.
2. Brick shall be cleanable using standard method specified below when using specified mortar.

B. Materials:

1. Mortar (as specified in Section 04 0513: 'Cement And Lime Masonry Mortaring'):
 - a. Type 'N' preferred for unit masonry three stories or less. Use Type 'S' if unit masonry is over three stories.
2. Brick:
 - a. Brick shall be true to size and shape. No warped brick permitted. Brick for Project shall be fired in same run.
 - b. 3-5/8 inches (90 mm) wide by 2-1/4 inches (56 mm) high by 7-5/8 inches (190 mm) long modular brick. [Field verify to match existing in size, color, and texture.]
 - c. Type One Acceptable Manufacturers, Style, And Color:
 - 1) Interstate Brick
9780 South 5200 West, West Jordan, UT 84081, Phone: 800-233-8654
 - 2) Old Virginia, Straight, 2 1/4" Modular (Field verify to match existing)

2.2 ACCESSORIES

A. Cleaning Compounds:

1. Use type of compound recommended by Brick Manufacturer based on minerals present in masonry units.
2. 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. Examine substrate and verify substrate is suitable for installation of masonry.
2. Verify built-in items are in proper location, and ready for roughing into masonry.

3. Notify Architect of unsuitable conditions in writing.
 - 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. Clean:
 1. Prior to placing masonry:
 - a. Clean reinforcement and shanks of anchor bolts by removing mud, oil, or other materials that will adversely affect or reduce bond at time mortar or grout is placed.
 - b. Remove laitance, loose aggregate, and anything else that would prevent mortar from bonding to foundation.

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. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
 2. Step back unfinished work for joining with new work. Use toothing only with Architect's approval.
 3. Built-In Work:
 - a. As work progresses, install masonry flashings and weep holes and other built-in work specified in other sections.
- C. 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 wall framing.
 3. Cold Weather and Hot Weather Limitations:
 - a. Place mortar as specified in Section 04 0501: 'Common Masonry Requirements'.
- D. Tolerances:
 1. Masonry shall be laid true to vertical and horizontal planes within **1/8 inch in 10 feet (3 mm in 3 meters)**, non-cumulative. Recess masonry where indicated.
 2. Maintain **3/8 inch (9.5 mm)** mortar joints throughout.
- E. Brick Masonry Units:
 1. Laying:
 - a. Layout:
 - 1) Running bond except where noted otherwise. Select brick so there is uniform distribution of hues.
 - 2) Use solid brick where brick coursing would otherwise show cores.
 - b. Joints:
 - 1) Do not tool until mortar has taken initial set.
 - 2) Tool concave. When tooling joints, squeeze mortar back into joint.
 - 3) Point holes in joints. Fill and tool properly.
 - c. Brick:

- 1) Wet each brick to saturation. Lay brick when surface is dry. Brick absorption when laid should not exceed **0.025 oz/sq inch (457 g/sq mm)** maximum.
 - 2) Shove brick into place in full mortar bed, do not lay.
 - 3) Completely fill horizontal and vertical joints. Do not furrow bed joints.
 - 4) Strike back-side joints on brick flush. Do not allow mortar build-up in cavity between masonry veneer and stud wall sheathing.
 - 5) Step back unfinished work for joining with new work. Use toothing only with Architect's approval.
2. Placing Mortar:
- a. General:
 - 1) Use mortar within two (2) hours of initial mixing. Discard mortar that has begun to set.
 - 2) Set masonry units within one (1) minute of spreading mortar.
 - b. Bed joints at foundations:
 - 1) In starting course on foundations and other supporting members, construct bed joints so that bed joint thickness is at least **1/4 inch (6.4 mm)** and not more than:
 - a) **3/4 inch (19 mm)** when masonry is ungrouted or partially grouted.
 - b) **1-1/4 inch (32 mm)** when first course of masonry is solid grouted and supported by concrete foundation.
 - c. Bed and head joints:
 - 1) Unless otherwise required, construct **3/8 inch (9.5 mm)** thick bed and head joints, except at foundation.
 - 2) Construct joints that also conform to following:
 - a) Fill holes not specified in exposed and below grade masonry with mortar.
 - b) Tool joint with round jointer when mortar is thumbprint hard.
 - c) Remove masonry protrusions extending **1/2 inch (12.7 mm)** or more into cells or cavities to be grouted.
 - d. Solid units:
 - 1) Unless otherwise required, place mortar so that bed and head joints are fully mortared and:
 - a) Do not fill head joints by slushing with mortar.
 - b) Construct head joints by shoving mortar tight against adjoining unit.
 - c) Do not deeply furrow bed joints.
 - e. Open end units with beveled ends:
 - 1) Fully grout open-end units with beveled ends.
 - 2) Head joints of open-end units with beveled ends need not be mortared:
 - a) At beveled ends, form grout key that permits grout within **5/8 inch (15.9 mm)** of face of unit.
 - b) Tightly butt units to prevent leakage of grout.

F. Masonry Veneer Ties:

1. Place corrugated sheet-metal anchors, sheet-metal anchors, and wire anchors as follows:
 - a. Free of material that may destroy bond.
 - b. Install in same course as masonry as brick reinforcement on centerline of brick width.
 - c. Install as detailed by screwing through sheathing into framing:
 - 1) Install as detailed by screwing through sheathing into framing.
 - 2) Begin approximately **8 inches (200 mm)** from base of masonry and with maximum spacing of **16 inches (400 mm)** vertically and at each vertical stud horizontally.
 - 3) Install final row of ties within **8 inches (200 mm)** of top course of brick.
 - d. Provide at least one (1) adjustable two-piece anchor, anchor of wire size W 1.7 (MWII), or **22 ga (0.8 mm)** corrugated sheet-metal anchor for each **2.67 sq ft (0.25 sq m)** of wall area.
 - 1) Provide at least one anchor of other types for each **3.5 sq ft (0.33 sq m)** of wall area.
 - e. Space anchors at maximum of **32 inches (813 mm)** horizontally and **25 inches (635 mm)** vertically, but not to exceed applicable requirement of as specified in two previous paragraphs.
 - f. Provide additional anchors around openings larger than **16 inch (400 mm)** in either dimension:
 - 1) Space anchors around perimeter of opening at maximum of **3 feet (0.90 m)** on center.
 - 2) Place anchors within **12 inch (300 mm)** of opening.
2. Seismic Reinforcing:
 - a. Install in same course as masonry ties on centerline of brick width.

- b. Attach reinforcing to ties in accordance with Manufacturer's instructions.
 - c. Lap ends of horizontal joint reinforcing **8 inches (200 mm)** at joints.
- G. Flashing:
1. General:
 - a. Install embedded flashing, metal drip edges, with weep holes and other components in masonry at lintels, ledges, floors, and other obstructions to downward flow of water in wall, and where indicated.
 - b. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. Flexible flashing:
 - a. Install embedded flashing behind lower edge of air infiltration barrier.
 - b. Carry flashing vertically as detailed, but not less than **6 inch (150 mm)** above horizontal plane.
 - c. Lap flexible flashing minimum of **6 inch (150 mm)**.
 - d. Seal all flashing laps with compatible lap cement.
 - e. Install flashing with sealant between flashing and drip edge/plate.
 - f. Do not stop flashing behind face of brickwork.
 - g. Place flashing at all points where air space is interrupted.
 - h. Extend head flashings no less than **6 inch (150 mm)** beyond edges of openings and turn up to form watertight pan, seal with mastic.
 - i. Extend sill flashings no less than **8 inch (200 mm)** minimum height to form watertight pan, seal with mastic.
 - j. All discontinuous flashing shall be turned up minimum **1 inch (25 mm)** into head joint a flashing ends to form an end dam.
 3. Drip edge/plate: Install with sealant (or equal) between drip edge/plate and substrate.
 4. Termination bar: Install termination bar with sealant.
- H. Weep Holes:
1. General:
 - a. Weep holes must be placed at base of cavity and at all other flashing levels providing means of draining away any moisture that may have found its way into cavity.
 - b. Weep holes must provide clear access to cavity and must be placed directly on flashing for proper drainage.
 2. Install weep vents in weep holes at **33 inches (875 mm)** on center maximum at bottom masonry course at foundation and above windows and doors.
- I. Vents (Open Head Joints):
1. Place vents at top of cavity air space of full height masonry walls.
 2. Install weep vents in weep holes at **33 inches (875 mm)** on center maximum and should be centered between weep holes at base of Masonry wall.
- J. Mortar Guard:
1. Place mortar guard continuously between brick and sheathing at bottom masonry course at foundation and above windows, and doors.
- K. Expansion Joints:
1. Unit Masonry:
 - a. See Contract Drawings if required):
 - 1) Keep clean of all mortar and debris.
 - 2) Install expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.
 - 3) Provide vertical joints where indicated by inserting compressible filler of width required for installing backer rod and sealant specified in section 07 9213: 'Elastomeric Joint Sealants', but not less than **3/8 inch (9.5 mm)**.

3.4 FIELD QUALITY CONTROL

- A. Field Tests And Inspections (Required Level 1 masonry inspection for non-essential facilities):
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. Masonry (Masonry Prisms, Masonry Units, Reinforcement, Mortar and Grout):
 - a. 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):
 - 1) 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. Clean up masonry debris and remove from site.

3.6 PROTECTION

- A. General:
1. During construction, all walls should be kept dry by covering top of wall with a strong, water-resistant membrane at end of each day or shutdown period. Covering should overhang wall by at least **24 inches (610 mm)** on each side, and should be secured against wind.
 2. Covering should remain in place until top of cavity wall is completed or protected by adjacent materials.
 3. 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.
- C. Stain prevention: Prevent grout, mortar, and soil from staining face of masonry to be left exposed. Immediately remove mortar and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with pointed and integral finishes, from mortar droppings.
4. Turn scaffold boards near wall on edge at end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

END OF SECTION

SECTION 04 2724**CAVITY WALL UNIT MASONRY: Enclosure Walls****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install cavity wall unit masonry as described in Contract Documents for:
 - a. Mechanical Equipment Enclosure Walls.
- B. Products Installed But Not Furnished Under This Section:
 - 1. Brick veneer.
 - 2. Precast concrete wall cap.
 - 3. Masonry Accessories.
- C. Related Requirements:
 - 1. Section 03 4800: 'Precast Concrete Specialties' for precast concrete wall caps.
 - 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 04 0520: 'Masonry Reinforcing' for quality of masonry reinforcing.
 - 7. Section 04 0523: 'Masonry Accessories' for drip edge/plate, flexible flashing, weep vents, and wall cap flashing.
 - 8. Section 04 2113: 'Brick Veneer Masonry'.

1.2 REFERENCES

- A. Definitions:
 - 1. Section 04 0501: 'Common Masonry Requirements' for:
 - a. Common Masonry Terms.
 - b. Brick and Brick Classifications.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C90-16, 'Standard Specification for Loadbearing Concrete Masonry Units'.
 - b. ASTM C216-14, 'Standard Specification for Facing Brick (Solid Masonry Made from Clay or Shale)'.
 - c. ASTM C331/C331M-14, 'Standard Specification for Lightweight Aggregates for Concrete Masonry Units'.
 - d. ASTM C476-16, 'Standard Specification for Grout for Masonry'.
 - 2. Masonry Standards Joint Committee (MSJC) - The Masonry Society (TMS) / American Concrete Institute (ACI) / American Society of Civil Engineers (SEI/ASCE):
 - a. TMS 402-13/ACI 530-13/ASCE 5-13 and TMS 602-13/ACI 530.1-13/ASCE 6-13, 'Building Code Requirements and Specification for Masonry Structures'.

1.3 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.

1.4 SUBMITTALS

- A. Action Submittals:
 1. Samples: As required in Section 04 2113.
- B. Informational Submittals:
 1. Manufacturer Report:
 - a. Certification that CMU meets specified compressive strength requirements.
- C. Closeout Submittals:
 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Manufacturer's documentation:
 - a) Brick Manufacturer's literature or cut sheet.
 - b) Brick color and type selection.

1.5 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
 1. As specified in 04 0501: 'Common Masonry Requirements'.
- B. Storage And Handling Requirements:
 1. Aggregate, Cementitious Material, Masonry Accessories, Masonry Units, and Reinforcement:
 - a. As specified in 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. Materials:
 1. Mortar: Type 'N' as specified in Section 04 0513: 'Cement and Lime Masonry Mortaring'.
 2. Grout:
 - a. Proportions of Ingredients:
 - 1) Grout proportions shall be determined by one of following methods:
 - a) As per ASTM C476 Table 1: 'Grout proportions by Volume' for fine and coarse grout.
 - b) 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:
 - (1) Grout shall be mixed to slump of **8 to 11 inches (200 to 280 mm)** as determined by Test Method ASTM C143/C143M and shall have minimum compressive strength of **2000 psi (14 MPa)** at 28 days.
 3. Concrete Masonry Units:
 - a. Design Criteria:

- 1) Meet requirements of ASTM C90, lightweight classification:
 - a) 85 lbs per cu ft (1 362 kg per cu meter) 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 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 Drawings.
4. Brick:
- a. Design Criteria:
 - 1) As specified in Section 04 2113: Brick Veneer Unit Masonry'.

2.2 ACCESSORIES

- A. Cleaning Compounds:
1. Use type of compound recommended by Brick Manufacturer based on minerals present in masonry units.
 2. 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. Notify Architect of unsuitable conditions in writing.
 - a. Do not install masonry over unsuitable conditions.
 - b. Commencement of Work by installer is considered acceptance of substrate.

3.2 PREPARATION

- A. Demolition and salvage of existing materials: Remove and salvage existing brick veneer and precast concrete wall caps from existing mechanical enclosure as described in Contract Documents.
- B. Coordinate placement of reinforcement, anchors and accessories, flashings and weep holes and other moisture control products specified in other sections.
- C. 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.
- D. Wetting Masonry Units:
1. Concrete masonry:
 - a. Do not wet concrete masonry units before laying. Wet cutting is permitted.
- E. Reinforcement:
1. Place reinforcement and ties in grout spaces prior to grouting.

3.3 INSTALLATION

- A. 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. Make cuts proper size to accommodate work of other trades.
 4. Built-In Work:
 - a. As work progresses, install masonry flashings and weep holes and other built-in work specified in other sections.
- B. Tolerances:
1. Masonry work shall be true to vertical and horizontal planes within **1/8 inch (3 mm)** in **10 feet (3 meters)**, non-cumulative.
 2. Maintain **3/8 inch (9.5 mm)** mortar joints throughout.
- C. Flashing:
1. General:
 - a. Install embedded flashing, metal drip edges, with weep holes and other components in masonry at base of wall.
 - b. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. Drip edge/plate: Install with sealant (or equal) between drip edge/plate and substrate.
 3. Through-wall (flexible) flashing:
 - a. Lap flexible flashing minimum of **6 inch (150 mm)**.
 - b. Seal all flashing laps with compatible lap cement.
 - c. Install flashing with sealant between flashing and drip edge/plate.
 - d. Flashing should be securely fastened to interior wythe and extend through face of exterior brick wythe.
 - e. Flashing should be turned up at least 8 inch and embedded in inner wythe.
 - f. Flashing should be carefully installed with no punctures or tears.
 - g. Where flashing is required to be lapped, ends of flashing should be overlapped a minimum of **6 inch (150 mm)** and laps properly sealed to avoid water running between the sections.
- 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. Mortar Guard:
1. Place mortar guard continuously between brick and CMU at bottom masonry course at foundation.
- F. Grouting:
1. General:
 - a. Provide grout that conforms to requirements as specified in Section 04 0516: 'Masonry Grouting'.
 - b. Confine grout to areas indicated on Contract Drawings. Use material to confine grout that permits bond between masonry units and mortar.
 2. Concrete Masonry Units:
 - a. Fully grout masonry enclosure walls.
 - 1) Place grout in **48 inch (1 200 mm)** maximum lifts.
 - 2) Consolidate grout by means of mechanical vibrator. Do not use cell reinforcing to rod grout.
 - 3) Before loss of plasticity, mechanically reconsolidate grout.
 - 4) If placement of grout is stopped for one hour or longer, provide horizontal construction joints by stopping grout at least **1.1/2 inches (40 mm)** below top of the course of block.

3. Do not grout space between wythes of masonry.

G. Laying:

1. Layout:
 - a. Running bond except where indicated otherwise.
 - b. Select brick so there is uniform distribution of hues.
 - c. Use solid brick where brick coursing would otherwise show cores.
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.
 - 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 an unobstructed cavity for grouting installed in cells:
 - d. 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.
4. Brick Masonry Units:
 - a. Wet each brick to saturation. Lay brick when surface is dry. Brick absorption when laid should not exceed **0.025 oz per sq in (1.1 kg per sq m)** maximum.
 - b. Shove brick into place in full mortar bed, do not lay.
 - c. Completely fill horizontal and vertical joints. Do not furrow bed joints.
 - d. Strike backside joints on brick flush. Do not allow mortar build-up in cavity between brick veneer and Concrete Masonry Units.
5. Weep Holes:
 - a. General:
 - 1) Weep holes must be placed at base of cavity and at all other flashing levels providing means of draining away any moisture that may have found its way into cavity.
 - 2) Weep holes must provide clear access to cavity and must be placed directly on flashing for proper drainage.
 - b. Install weep vents in weep holes at **33 inches (875 mm)** on center maximum at bottom masonry course at foundation.

H. Reinforcing:

1. Reinforcing shall be free of material that may destroy bond.
2. Continuous Joint Reinforcing:
 - a. Beginning approximately **8 inches (200 mm)** from base of masonry, provide joint reinforcing **16 inches (400 mm)** on center vertically, except **8 inches (200 mm)** on center if drip crimped.
 - b. Maximum offset between brick and block coursing is **1-1/4 inch (32 mm)** 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 (150 mm)**.
3. Masonry Reinforcing Steel:
 - a. Place steel as shown on Contract Drawings.
 - b. Splice 48 bar diameters minimum.
 - c. Place reinforcing and dowels before pouring grout.
 - d. Dowel vertical reinforcing bars out of structure below with bars of same size and spacing.
 - e. Place horizontal bars in **8 inch (200 mm)** deep bond beam units at top of wall and at **48 inches (1 200 mm)** on center between. Continue bond beam units and reinforcement uninterrupted around corners and across wall intersections.

- f. 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.
- g. Unless detailed otherwise, place special horizontal bars of same size as normal reinforcing above and below openings. Extend bars **24 inches (600 mm)** minimum beyond opening.

3.4 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
 1. Tests and inspections are not required for masonry materials in enclosure walls.
- 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.

3.1 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 (610 mm)** 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.
- C. Stain prevention: Prevent grout, mortar, and soil from staining face of masonry to be left exposed. Immediately remove mortar and soil that come in contact with such masonry.
 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 2. Protect sills, ledges, and projections from mortar droppings.
 3. Protect surfaces of window and door frames, as well as similar products with pointed and integral finishes, from mortar droppings.

4. Turn scaffold boards near wall on edge at end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

END OF SECTION

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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 1223 STRUCTURAL STEEL FOR BUILDINGS

END OF TABLE OF CONTENTS

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

- A. Includes But Not Limited To:
 - 1. Quality of factory or shop-applied priming applied to steel supplied to Project without finish coat.
 - 2. Quality of and procedures for field touch-up and repair of factory-applied priming and galvanizing.
 - 3. Quality of and procedures for shop-applied finish applied to steel supplied to Project for Steeple Base Support as described in contract documents.
- B. Related Requirements:
 - 1. Section 05 4010: 'Cold-Formed Load-Bearing Metal Framing' for repair to galvanized coatings.
 - 2. Sections under 09 9000 heading: Finish painting.

1.2 REFERENCES

- A. Reference Standards:
 - 1. ASTM International:
 - a. ASTM A780/A780M-09(2015), 'Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings'.
 - b. ASTM B695-04(2016), 'Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel'.

1.3 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.

1.4 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 Galvilite 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 (270 to 275 deg C), or
 - 2) Zinc-Tin-Lead alloy with liquidus temperature range from 446 to 500 deg F (230 to 260 deg C).
 - b. Sprayed Zinc: Wire, ribbon, or powdered zinc suitable for process.
- E. Steeple Base Support:
1. Finish:
 - a. Corlar 2.1-ST satin high solids epoxy mastic by Dupont Industrial Coatings.
 - 1) Thickness: Apply 10 mils thick.
 - b. Type One Acceptable Manufacturers:
 - 1) Dupont Industrial Coatings, Wilmington, DE www.dupont.com.
 - 2) Equal as approved by Architect before bidding. See Section 01 6200.

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 (316 deg C).
 - a) Do not overheat surface beyond 750 deg F (400 deg C) 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 (7 deg C).
 - 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.

3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
 1. Steeple Base:
 - a. Touch-up damaged coatings.

3.4 PROTECTION

- A. Steeple Base:
 1. Protect finished coatings until completion of project.

END OF SECTION

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

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

1.2 REFERENCES

- A. Reference Standards:
 - 1. American National Standards Institute / American Welding Society:
 - a. ANSI/AWS D1.1/D1.1M:2015, 'Structural Welding Code - Steel'.
 - b. ANSI/AWS D1.3/D1.3M:2018, 'Structural Welding Code - Sheet Steel'.
 - 2. ASTM International:
 - a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.
 - b. ASTM A307-14, 'Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength'.

1.3 QUALITY ASSURANCE

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

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Materials:
 - 1. Bolts And Threaded Fasteners:
 - a. Anchor Rods For Steeple Base Connections: Conform to requirements of ASTM A36/A36M.
 - b. Bolts: Conform to requirements of ASTM A307, Grade A.

2.2 ACCESSORIES

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

PART 3 - EXECUTION**3.1 PERFORMANCE**

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

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. Lintels.
- B. Related Requirements:
 - 1. Sections under 04 2000 heading: Installation of lintels, channel frames, and miscellaneous structural steel.
 - 2. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of priming.
 - 3. Section 05 0523: 'Metal Fastening' for quality of welding.
 - 4. Section 06 1100: 'Wood Framing' for installation of miscellaneous structural steel.
 - 5. Section 09 9113: 'Exterior Painted Galvanized Metal' for preparing and painting new exterior exposed galvanized metal surfaces.

1.2 REFERENCES

- A. Reference Standards:
 - 1. American Society For Testing And Materials:
 - a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.
 - b. ASTM A53/A53M-18, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
 - c. ASTM A500/A500M-18, 'Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes'.

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) Lintels for exterior walls.
- B. Fabrication:
 - 1. After fabrication and before shop priming, hot-dip or mechanically galvanize to be installed in following:
 - a. Lintels in exterior walls.
 - 2. Shop prime steel provided under this Section.
- C. Finishes:
 - 1. Galvanized:
 - a. Galvanize finish for following:
 - 1) 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

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 4512 ARCHITECTURAL WOODWORK WOOD TRIM

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

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

1.2 REFERENCES

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

1.3 SUBMITTALS

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

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

- a. Arch Wood Protection Inc, Atlanta, GA www.wolmanizedwood.com.
- 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 (4 kg per cu meter)**.
 - 2) Zinc borate meeting requirements of AWPA U1 and with retention of **0.17 lbs per cu ft (2.7 kg per cu meter)**.
 - 3) CCA-C (47.5 percent chromium trioxide, 18.5 percent copper oxide and 34 percent arsenic pentoxide) by Koppers Performance Chemicals, Griffin, Georgia, <http://www.koppersperformancechemicals.com/> (0.25 lb/cu ft minimum retention).
 - 4) DURA-GUARD by Hoover Treated Wood Products, Thomson, GA www.frtw.com (.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 REFERENCES

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

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature on framing anchors and powder actuated fasteners.
 - 2. Shop Drawings:
 - a. Submit diameter and lengths of fasteners proposed for use on Project. If length or diameter of proposed fasteners differ from specified fasteners, also include technical and engineering data for proposed fasteners including, but not limited to:
 - 1) Adjusted fastener spacing where using proposed fasteners and,
 - 2) Adjusted number of fasteners necessary to provide connection capacity equivalent to specified fasteners.
 - b. Submit on powder-actuated fasteners other than those specified in Contract Documents showing design criteria equivalents at each application.
 - c. Show type, quantity, and installation location of framing anchors. Where necessary, reference Drawing details, etc, for installation locations.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

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

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

B. Materials:

1. 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.
 4. Framing Anchors:
 - a. Framing anchors and associated fasteners in contact with preservative hot dipped zinc-coated galvanized steel or stainless steel. Do not use stainless steel items with galvanized items.
 - b. Type Two Acceptable Products:
 - 1) KC Metals Inc, San Jose, CA www.kcmetals.com.
 - 2) Simpson Strong Tie Co, Dublin, CA www.strongtie.com.
 - 3) United Steel Products Co Inc (USP), Montgomery, MN www.uspconnectors.com.
 - 4) Equals as approved by Architect through shop drawing submittal before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 ERECTION

- A. Secure one Manufacturer approved fastener in each hole of framing anchor that bears on framing member unless approved otherwise in writing by Architect.

- B. Provide washers with bolt heads and with nuts bearing on wood.

END OF SECTION

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

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

1.2 REFERENCES

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

1.3 ADMINISTRATIVE REQUIREMENTS

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

1.4 SUBMITTALS

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

2.2 ACCESSORIES

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

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

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

B. Interface With Other Work:

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

C. Tolerances:

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

D. Walls:

1. Openings: Single, bearing stud supporting header and one adjacent (king) stud continuous between top and bottom plates, unless shown otherwise.
2. Corners And Partition Intersections: Triple studs.
3. Top Plates In Bearing Partitions: Doubled or tripled and lapped. Stagger joints at least 48 inches (1 200 mm).
4. Stud Walls To Masonry. Use one of the following methods:
 - a. Connect with 1/2 inch (13 mm) machine bolts 6 inches (150 mm) from top, 6 inches (150 mm) from bottom, and 48 inches (1 200 mm) maximum on center. Use three bolts minimum in height of 6 foot (1 800 mm) or higher wall.
 - b. Secure wood to masonry using continuous 1/4 inch (6 mm) minimum bead of construction adhesive and powder actuated fasteners installed at 32 inches (800 mm) on center minimum.
5. Firestops:
 - a. Horizontal or vertical concealed spaces in walls, light coves, soffits, drop ceilings, and other features over 10 feet (3 000 mm) in length or height, and at stairs, ceiling levels, floor levels, and other junctures of horizontal to vertical concealed spaces.
 - b. Within concealed spaces of exterior wall finishes and exterior architectural elements, such as trims, cornices or projections, at maximum intervals of 20 feet (6 000 mm), length or height.
6. Sill Plates:
 - a. Shear Walls And Bearing Walls:
 - 1) Provide specified anchor 12 inches (300 mm) maximum and 4 inches (100 mm) minimum from each end of each plate.
 - 2) Shear Walls: Fasten with anchor bolts embedded in concrete or with screw anchors.
 - 3) Bearing Walls: Fasten with anchor bolts embedded in concrete, or with screw anchors or expansion bolts in drilled holes.
 - b. Non-Structural Walls: Fasten with powder actuated fasteners.
 - c. In addition to requirements of paragraphs 'a' and 'b' above, set sill plates of interior walls measuring less than 36 inches (900 mm) in length in solid bed of specified construction adhesive, except where sill sealer is used.
 - d. Install specified seal sealer under sill plates of exterior walls of main building and of acoustically insulated interior walls.
 - e. Masonry Wall Plates:
 - 1) Anchor 2x6 and 2x8 wall plates to top of block walls with 5/8 inch (16 mm) diameter anchor bolts at 32 inches (800 mm) 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.
- 7. Posts And Columns:
 - a. Unless shown otherwise, nail members of multiple member columns together with 16d at **6 inches (150 mm)** on center from each side.
- 8. Beams And Girders:
 - a. Built-Up Members:
 - 1) Stagger individual members of multiple span beams and girders so, over any one support, no more than half the members will have a joint. In all cases, however, joints shall occur over supports.
 - 2) Unless shown otherwise on Drawings, nail two-ply built-up members with 10d nails **12 inches (300 mm)** on center top and bottom, staggered on opposite sides. Nail three-ply built-up members with 16d nails at **12 inches (300 mm)** on center, top and bottom, staggered, on opposite sides. Set with crown edge up with full bearing at ends and intermediate supports.
 - b. Pre-Fabricated Members:
 - 1) Solid glu-lam, LVL, LSL, or PSL members may be used in place of built-up **2x (38 mm)** framing members. Size shall be same as built-up member.
 - 2) Solid LVL or PSL members may be used in place of built-up LVL members. Size shall be same as sum of built-up members.
 - c. Wood shims are not acceptable under ends.
 - d. Do not notch framing members unless specifically shown in Drawing detail.
- 9. Nailing:
 - a. Stud to plate (coordinate with Contract Drawings):

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

- b. Top plates: Spiked together, 16d, **16 inches (400 mm)** on center.
 - c. Top plates: Laps, lap members **48 inches (1200 mm)** minimum and nail with 16d nails **4 inches (100 mm)** on center
 - d. Top plates: Intersections, three 16d.
 - e. Backing And Blocking: Three 8d, each end.
 - f. Corner studs and angles: 16d, **16 inches (400 mm)** on center.
- E. Roof And Ceiling Framing:
- 1. Place with crown side up at **16 inches (400 mm)** on center unless noted otherwise.
 - 2. Install structural blocking and bridging as necessary and as described in Contract Documents.
 - 3. Special Requirements:
 - a. Roof And Ceiling Joists: Lap joists **4 inches (100 mm)** minimum and secure with code approved framing anchors.
 - b. Roof Rafters And Outlookers:
 - 1) Cut level at wall plate and provide at least **2-1/2 inches (64 mm)** bearing where applicable. Spike securely to plate with three 10d nails.
 - 2) Attach to trusses or other end supports with framing anchors described in Contract Documents.
 - 3) Provide for bracing at bearing partitions.
 - 4. Installation of Structural Composite Lumber:
 - a. Install temporary horizontal and cross bracing to hold members plumb and in safe condition until permanent bracing is installed.
 - b. Install permanent bracing and related components before application of loads to members.
 - 5. Secure headers and header backing to structure as described in Contract Documents.

- F. Accessory / Equipment Mounting And Gypsum Board Back Blocking (nailers) for Wood Framing):
1. Furnish and install blocking in wood framing required for hardware, specialties, equipment, accessories, and mechanical and electrical items, etc.
 2. Furnish and install back blocking in wood framing required for joints in gypsum wallboard.
 - a. Install back blocking between I-joist framing members with equivalent of Simpson Z2 clips attached with four 10d x 1-1/2 inches (38 mm) nails at each end, two into 'I' joist and two into blocking.
 - b. Attach back blocking at trusses, stick framing, or walls with two 10d nails in each end of each piece of blocking.
- G. Accessory / Equipment Mounting And Standing & Running Trim Blocking (nailers) for Metal Framing:
1. Furnish and install blocking in wood framing required for hardware, specialties, equipment, accessories, and mechanical and electrical items, etc.
 2. Attach blocking not installed with clips with two fasteners in each end of each piece of blocking.
- H. Furring Strips:
1. On Wood or Steel: Nail or screw as required to secure firmly.
 - a. Ceiling:
 - 1) Attach furring strips to the underside of structural elements with #8 wood screws, of length to penetrate wood framing 1 inch (25 mm) minimum.
 - b. for location of basketball hanger brackets.
 - c. Verify field dimension of brackets.

END OF SECTION

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

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

1.2 REFERENCES

- A. Association Publications:
 - 1. National Institute of Standards and Technology (NIST), U. S. Department of Commerce:
 - a. Voluntary Product Standard DOC PS 1-09. 'Structural Plywood'.
 - b. Voluntary Product Standard DOC PS 2-04. 'Performance Standard for Wood-Based Structural-Use Panels'.
 - 2. The Engineered Wood Association (APA), Tacoma, WA www.apawood.org.
 - a. Performance Rated Panels, 'Product Guide' (for products bearing the APA trademark) December 2011.
 - b. Voluntary Product Standard:
 - 1) PS 1-09. 'Structural Plywood'.
 - 2) PS 2-04. 'Performance Standard for Wood-Based Structural-Use Panels'.
 - c. PRP-108 'Performance Standards and Policies for Structural-Use Panels'.
 - 3. TECO, Cottage Grove, WI www.tecotested.com.
 - a. TECO PRP-133: ('Fire Rated Assemblies – OSB substitution for plywood in UL fire-rated assemblies that specify plywood).
- B. Reference Standards:
 - 1. CSA O151-09 (R2014), 'Canadian Softwood Plywood'.
 - 2. International Code Council (IBC) (2018 or latest AHJ approved edition):
 - a. IBC Chapter 17, 'Special Inspections And Tests'.

1.3 ADMINISTRATIVE REQUIREMENTS

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

1.4 SUBMITTALS

- A. 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 sheathing.
- B. Testing and Inspection:
 - 1. Owner will provide Testing and Inspection for inspection of sheathing:
 - a. Owner will employ testing agencies to perform inspection for sheathing as specified in Field Quality Control in Part 3 of this specification.
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
 - 2) See Section 01 1200: 'Multiple Contract Summary'.
 - b. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control.
 - 1) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

Thickness	Span Rating
3/8 inch	24 / 0
7/16 inch nominal	24 / 16
15/32 inch actual	32 / 16

1/2 inch nominal	32 / 16
19/32 inch actual	40 / 20
5/8 inch nominal	40 / 20
23/32 inch actual	48 / 24
3/4 inch nominal	48 / 24

2.2 ACCESSORIES

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

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
1. Top of nail heads shall be flush with sheathing surface.
 2. Use of edge clips to provide spacing between sheathing panels is acceptable.
- B. Wall Sheathing:
1. Spacing:
 - a. Provide 1/8 inch (3 mm) space between sheets at end and edge joints.
 2. Edge Bearing And Blocking:
 - a. Panel edges shall bear on framing members and butt along their center lines.
 - b. Back block panel edges, which do not bear on framing members, with 2 inch nominal (45 mm) framing.
 3. Nail Spacing:
 - a. As indicated on Contract Drawings.
 - b. Place nails not less than 3/8 inch (9.5 mm) in from edge.
 4. Thickness:
 - a. As indicated on Contract Drawings.
 5. Do not install any piece of wall sheathing with shortest dimension of less than 12 inches (300 mm).
- C. Roof Sheathing:
1. Placing:
 - a. Lay face grain at right angles to supports. Provide blocking for support if framing turns at roof overhang.
 - b. Provide 1/8 inch (3 mm) space between sheets at end and side joints.
 - c. Stagger panel end joints.
 - d. Sheathing shall be continuous of two spans minimum.
 2. Edge Bearing and Blocking:
 - a. As indicated on Contract Drawings.
 3. Nail Spacing:
 - a. As indicated on Contract Drawings.
 - b. Place nails at least 3/8 inch (9.5 mm) in from edge.
 4. Thickness:
 - a. As indicated on Contract Drawings.
 5. Do not install any piece of roof sheathing with shortest dimension of less than 24 inches (600 mm) unless support is provided under all edges.

3.2 FIELD QUALITY CONTROL

- A. Field Inspections:
1. Sheathing:

- a. General:
 - 1) Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - 2) Quality Control is sole responsibility of Contractor as specified in Section 01 4523 'Testing And Inspection Services'.
- b. For walls and roof areas where nail spacing is 4 inches (100 mm) and less on center, Inspector shall verify wood panel sheathing, grade, thickness and nominal size of framing members, adjoining panel edges, nail size and spacing, bolting and other fastening of other components.

3.3 PROTECTION

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

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. Chair Rails.
 - 2. Miscellaneous Wood Trim.
 - 3. Selected Building Specialties.
 - 4. Miscellaneous as specified elsewhere.

- C. Related Requirements:
 - 1. Section 06 1100: 'Wood Framing' for furring and blocking.
 - 2. Section 06 2210: 'Miscellaneous Wood Trim'.
 - a. Wood Trim.
 - 3. Sections under 06 4000 Heading: Furnishing of Architectural Woodwork.
 - a. Section 06 4001: 'Common Architectural Woodwork Requirements':
 - 1) Approved Fabricators.
 - 2) Quality of wood materials to be used in Finish Carpentry.
 - b. Section 06 4512: 'Architectural Woodwork Wood Trim'.
 - 4. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants, submittal and installation requirements.
 - 5. Sections under 09 9000 heading: Back priming of work to be installed against concrete or masonry or subjected to moisture, and finishing of finish carpentry and architectural woodwork.
 - 6. Sections in Division 10: Furnishing of Specialties.

1.2 REFERENCES

- A. Association Publications:
 - 1. Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA www.awinet.org.
 - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturers:

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

B. Glue: Waterproof and of best quality.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

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

3.2 PREPARATION

A. Surface Preparation:

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

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

3.3 INSTALLATION

A. Special Techniques:

1. AWS Custom Grade is minimum acceptable standard, except where explicitly specified otherwise, for installation of architectural woodwork.

B. General Architectural Woodwork Installation:

1. Fabricate work in accordance with measurements taken on Project site.

2. Scribe, miter, and join accurately and neatly to conform to details.
 3. Exposed surfaces shall be machine sanded, ready for finishing.
 4. Allow for free movement of panels.
 5. Countersink nails. Countersink screws and plug those exposed to view.
 6. Attach custom casework as specified in Sections under 06 4000 Heading: 'Furnishing of Architectural Woodwork' to wall blocking with #10 x 3 inch (76 mm) minimum Cabinet Screws. Attach wall cabinets with screws equally spaced horizontally not to exceed 12 inches (305 mm) O.C. with 3 inch (76 mm) maximum spacing at cabinet edges.
- C. Items Installed But Not Furnished Under This Section: Install in accordance with requirements specified in Section furnishing item.

END OF SECTION

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

- A. Includes But Not Limited To:
 - 1. Furnish and install sealants for caulking door frames as described in Contract Documents.
 - 2. Furnish and install insulation in doorframes as described in Contract Documents.

- B. Products Installed But Not Furnished Under This Section:
 - 1. Flush wood doors.
 - 2. Hollow metal door frames.
 - 3. Finish hardware.

- C. Related Requirements:
 - 1. Section 08 1416: 'Flush Wood Doors'.
 - 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.
 - 2. In addition to agenda items specified in Section 01 3100, review following:
 - a. Schedule conference after hardware has been delivered to site and organized into hardware groups by door, but before installation of hardware.
 - b. Check for appropriate blocking and for correct hardware models and fasteners for substrates.
 - c. Review submittals and set of Manufacturer's installation, adjustment, and maintenance instructions submitted under Section 08 7101.
 - d. Review use of crowbar or other prying devices are not permitted to be used to set door frame into wall opening.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 INSTALLATION

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

- b. 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

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

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

1.2 REFERENCES

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

1.3 SUBMITTALS

- A. Action Submittals:
1. Samples:
 - a. Interior Hardwood for Transparent Finish:
 - 1) Before performing work of this Section, prepare Control Sample, to match sample available from Owner, to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
 - 2) Design Criteria:
 - a) Provide **8 inch by 10 inch (200 mm by 255 mm)** sample of 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.
3. Clear Finished Paneling: Match materials specified in Sections 06 4216.
4. Opaque Finished Hardwood: Hardwood allowed by AWS Custom Grade.
5. Opaque Finished Softwood: Solid stock Pine, C or better, S4S.
6. Opaque Finished Paneling: Paneling allowed by AWS Custom Grade.

2.2 SOURCE QUALITY CONTROL

A. Inspections:

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

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

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

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

1.2 REFERENCES

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

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
 - 1. Fabricator:
 - a. Fabricator Firm specializing in performing work of this section.

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

1.5 DELIVERY, HANDLING, AND STORAGE

A. Delivery And Acceptance Requirements:

1. Assemble architectural woodwork at Architectural Woodwork Fabricator's plant and deliver ready for erection insofar as possible.
2. Protect architectural woodwork from moisture and damage while in transit to job site.
3. Report damaged materials received within two (2) days from delivery at project site.

B. Storage And Handling Requirements:

1. Unload and store in place where it will be protected from moisture and damage and convenient to use.

PART 2 - PRODUCTS

2.1 FABRICATORS

A. Approved Fabricators. See Section 01 4301:

1. Meet Quality Assurance Fabricator Qualifications as specified in Part 1 of this specification.

2.2 ASSEMBLIES

A. Design Criteria:

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

meters) may have no more than one joint. No joints shall occur within 72 inches (1 800 mm) of outside corners nor within 18 inches (450 mm) of inside corners.

- 4) Moisture content shall be six (6) percent maximum at fabrication. No opening of joints due to shrinkage is acceptable.

B. Fabrication:

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

PART 3 - EXECUTION: Not Used

END OF SECTION

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

- A. Products Furnished But Not Installed Under This Section:
 - 1. 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 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 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. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
 - 2. Plain-Sawn: A hardwood figure developed by sawing a log lengthwise at a tangent to the annual growth rings. It appears as U-shaped or straight markings in the board's face.
 - 3. Running Trim: Generally combined in the term "standing and running trim" and refers to random, longer length trims delivered to the jobsite (e.g., baseboard, chair rail, crown molding).

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Include materials used, standing and running trim profiles, joint details, and hardware.
 - 2. Samples:
 - a. Interior Hardwood for Transparent Finish:
 - 1) Before performing work of this Section, prepare Control Sample, to match sample available from Owner, to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
 - 2) Design Criteria:
 - a) Provide **8 inch by 10 inch (200 mm by 255 mm)** sample of 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. 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) Paneling shall be panel product with plain sliced Red Oak veneer.
 - 3) Finish to match Owner selected sample as specified in Section 09 9324.
 - b. Match existing Project Color Scheme:
 - 1) Control Sample provided by Owner:
 - a) Control Sample will be existing wood item from Project.
 - 2. Interior Wood For Opaque, Painted Finish:
 - a. Applies to ceiling trim only.
 - b. Solid wood shall be any species allowed by AWS Custom grade.
- D. Shelves:
 - 1. Conform to applicable requirements of Sections 06 4001 and 06 4114.
 - 2. Use **3/4 inch (19 mm)** 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 (25 mm)** 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

DIVISION 07: THERMAL AND MOISTURE PROTECTION

07 2000 THERMAL PROTECTION

07 2116 BLANKET INSULATION

07 9000 JOINT PROTECTION

07 9213 ELASTOMERIC JOINT SEALANTS

END OF TABLE OF CONTENTS

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

A. Includes But Not Limited To:

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

B. Related Requirements:

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

1.2 REFERENCES

A. Reference Standards:

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

1.3 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

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

PART 2 - PRODUCTS**2.1 SYSTEMS**

A. Manufacturers:

1. Insulation:

a. Type One Acceptable Manufacturers:

- 1) Certaineed Corp, Valley Forge, PA www.certainteed.com.
- 2) FiberTEK, Salt Lake City, UT www.fibertekinsulation.com.
- 3) Guardian Fiberglass, Greer, SC www.guardianbp.com.
- 4) Johns Manville, Denver, CO www.jm.com.
- 5) Knauf Fiber Glass, Shelbyville, IN www.knaufusa.com.
- 6) Owens-Corning Fiberglass Corporation, Toledo, OH www.owens-corning.com.
- 7) 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 (400 or 600 mm) wide according to framing spacing.
- b. Faced Insulation:
 - 1) Kraft faced meeting requirements of ASTM C665, Type II, Class C.
 - 2) Foil faced meeting requirements of ASTM C665, Type III.

- a) Class A: Exposed insulation.
- b) Class B: Enclosed insulation.
- c. Unfaced Insulation: Meet requirements of ASTM C665, Type I.
 - 1) Support at trussed rafters:
 - a) Provide support at trussed rafters where insulation is not enclosed by structure or drywall.
 - b) Provide stings/wires which run perpendicular to framing and attach at each trussed rafter and to framing at **32 inches (800 mm)** O.C. minimum and where batt ends adjoin each other.
 - or
 - c) Class Two Quality Standard: Simpson Strong Tie IS Insulation Supports with **14 gauge (1.89 mm)** carbon steel, spring wire and mitered tips for **16 inch (400 mm)** O.C. and **24 inch (610 mm)** O.C. spacing.
- d. 'R' Value Required:
 - 1) Acoustically Insulated Ceilings:
 - a) Enclosed Spaces: Fill framed cavity with batt of appropriate thickness.
 - b) Unenclosed Spaces: R-19.
 - c) Unenclosed Spaces above Offices and Restrooms: R-30.
 - 2) Thermally Insulated Ceilings / Roof:
 - a) R-38 Standard
 - 3) Wood Wall Stud Framing:

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

2.2 ACCESSORIES SYSTEMS

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

PART 3 - EXECUTION

3.1 INSTALLATION

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

END OF SECTION

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

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

1.2 REFERENCES

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

2. Silicone: Any member of family of polymeric products whose molecular backbone is made up of alternating silicon and oxygen atoms and which has pendant hydrocarbon groups attached to silicon atoms. Used primarily as a sealant. Offers excellent resistance to water and large variations in temperature (minus 100 deg F to + 600 deg F) (minus 73.3 deg C to + 316 deg C).

B. Reference Standards:

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

1.3 ADMINISTRATIVE REQUIREMENTS

A. Scheduling:

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

1.4 SUBMITTALS

A. Action Submittals:

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

B. Informational Submittals:

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

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience.
2. Applicator Qualifications:
 - a. Company specializing in performing work of this section.
 - b. Provide if requested, reference of projects with minimum three (3) years documented experience, minimum three (3) successfully completed projects of similar scope and complexity, and approved by manufacturer.

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 FIELD CONDITIONS

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

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEMS

- A. Manufacturers:
1. Manufacturer Contact List:
 - a. Dow Corning Corp., Midland, MI www.dowcorning.com.
 - 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 or Sika Canada Inc, Pointe Claire, QC www.sika.ca.
- h. Tremco, Beachwood, OH www.tremcosealants.com or Tremco Ltd, Toronto, ON (800) 363-3213.

B. Materials:

1. Design Criteria:

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

2. Sealants At Exterior Building Elements:

- a. Description:
 - 1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
 - a) Aluminum entrance perimeters and thresholds.
 - b) Columns.
 - c) Connections.
 - d) Curtainwalls.
 - e) Door frames.
 - f) EIFS to metal joints.
 - g) Joints and cracks around windows.
 - h) Louvers.
 - i) Masonry.
 - j) Parapet caps.
 - k) Wall penetrations.
 - l) 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) Gutters.
 - c) Penetrations in soffits and fascias.
 - d) Roof vents and flues.
 - e) Lightning protection components.
 - 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) Sealant required at expansion for following areas:
 - a) Between entryway slabs and building foundations.
 - b) Between sidewalks and building foundations.
 - c) Miscellaneous vertical applications.
 - 3) Sealant NOT required at expansion joints for following areas:
 - a) Within aprons and where aprons abut building foundations and sidewalks.
 - b) Within mowstrips and where mowstrips abut building foundations and sidewalks.
 - c) Within sidewalks.
 - 4) 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) Retaining walls.
 - b) Miscellaneous vertical applications.
 - 3) Sealant is NOT required at control joints, unless needed to protect moisture sensitive soils or by Contract Drawings, in following areas:
 - a) Within aprons.
 - b) Within mowstrips.
 - c) Within sidewalks.
 - d) Within entryway slabs.
 - 4) 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 Precast Concrete Cap and Joint Covers:
 - a. Description:
 - 1) Soft lead strip, when set and bedded in sealant, form cap which assures permanent elastic seal for any masonry joint as specified in Section 03 4800.
 - b. Design Criteria:
 - 1) Meet following standards for Sealant:
 - a) ASTM C920: Type S, Grade NS, Class 50 Use A, G, M.
 - b) Strips should be of sufficient size to cover the joint width, plus percentage allowance for anticipated joint movement, plus **1/4 inch (6.4 mm)**.
 - 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) Sika:
 - a) Primer: Sikasil Primer-2100.
 - b) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
 - 4) Tremco:
 - a) Primer:
 - (1) Metal surface: No. 20 primer.
 - (2) Porous surfaces: No. 23 primer.
 - b) Sealant: Spectrum 1 Silicone Sealant.
- 7. General Interior Sealants:
 - a. General:
 - 1) Inside jambs and heads of exterior door frames.
 - 2) Both sides of interior door frames.
 - 3) Inside perimeters of windows.
 - 4) 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: Latacil 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.

2.2 ACCESSORIES

- A. Bond Breaker Tape:
1. Pressure sensitive tape as by Sealant Manufacturer to suit application.
 2. Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.
- B. Joint Backing:
1. Comply with ASTM C1330.
 2. Flexible closed cell, non-gassing polyurethane or polyolefin rod or bond breaker tape as recommended by Sealant Manufacturer for joints being sealed.
 3. Oversized 25 to 50 percent larger than joint width.
- C. Joint Cleaner:
1. Non-corrosive and non-staining type as recommended by Sealant Manufacturer, compatible with joint forming materials.
- D. Masking Tape:
1. Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Preparation:
1. Remove existing joint sealant materials where specified.
 - a. Clean joint surfaces of residual sealant and other contaminates capable of affecting sealant bond to joint surface using manufacturer's recommended joint preparation methods.

- b. Repair deteriorated or damaged substrates as recommended by Sealant Manufacturer to provide suitable substrate. Allow patching materials to cure.
 2. Surfaces shall be clean, dry, free of dust, oil, grease, dew, frost or incompatible sealers, paints or coatings that may interfere with adhesion. Prepare substrates in accordance with Manufacturer's instructions:
 - a. Porous surfaces: Clean by mechanical methods to expose sound surface free of contamination and laitance followed by blasting with oil-free compressed air.
 - b. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193. Allow solvent to evaporate prior to sealant application.
 - c. High-pressure water cleaning: Exercise care that water does not enter through failed joints.
 - d. Primers:
 - 1) Primers enhance adhesion ability.
 - 2) Use of primers is not a substitution for poor joint preparation.
 - 3) Primers should be used always in horizontal application where there is ponding water.
 3. Field test joints in inconspicuous location.
 - a. Verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.
 - b. When test indicates sealant adhesion failure, modify joint preparation primer, or both and retest until joint passes sealant adhesion test.
 4. Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.
 - B. Joints:
 1. Prepare joints in accordance with ASTM C1193.
 - a. Clean joint surfaces of 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 (4 deg C).
 - b. Below-grade applications.
 - c. Brass and copper surfaces.
 - d. Materials bleeding oils, plasticizers, and solvents.
 - e. Structural glazing and adhesive.
 - f. Surfaces to be immersed in water for prolonged time.
- B. Joint Backing:
 1. Install joint backing to maintain sealant joint ratios recommended by Manufacturer.
 2. Install without gaps, twisting, stretching, or puncturing backing material. Use gage to ensure uniform depth to achieve correct profile, coverage, and performance.
 3. Rod for open joints shall be at least 1-1/2 times width of open joint and of thickness to give solid backing. Backing shall fill up joint so depth of sealant bite is no more than 3/8 inch (9.5 mm) deep.
- C. Bond Breaker:

1. Install bond breaker where joint backing is not used or where backing is not feasible.
 - a. Apply bond-breaker tape in shallow joints as recommended by Sealant Manufacturer.
- D. Sealant:
 1. Apply sealant with hand-caulking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint. Apply sealants in vertical joints from bottom to top.
 2. Fill joint opening to full and proper configuration.
 3. Apply in continuous operation.
 4. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface. Tool joints in opposite direction from application direction, i.e., in vertical joints, from the top down. Do not 'wet tool' sealants.
 5. Depth of sealant bite shall be **1/4 inch (6 mm)** minimum and **1/2 inch (12.7 mm)** maximum, but never more than one half or less than one fourth joint width.
- E. Caulk gaps between painted or coated substrates and unfinished or pre-finished substrates. Caulk gaps larger than **3/16 inch (5 mm)** between painted or coated substrates.

3.4 TOLERANCES

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

3.5 FIELD QUALITY CONTROL

- A. Adhesion Test (Installer Option to use adhesion test to determine if primer is required).
 1. Perform adhesion tests in accordance with Manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant joint Hand-Pull Tab:
 - a. Perform five (5) tests for first **1,000 linear feet (300 meters)** of applied silicone sealant and one (1) test for each **1,000 linear feet (300 meters)** seal thereafter or perform one (1) test per floor per building elevation minimum.
 - b. For sealants applied between dissimilar materials, test both sides of joints.
 2. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
 3. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

3.6 CLEANING

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

END OF SECTION

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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 1313 HOLLOW METAL DOORS

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 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 and 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. Interior Double Doors:
1. **Group ST9:**
 - a. General:
 - 1) No Threshold
 - 2) Door Contact Alarm Device (by Division 28)

- b. Active Leaf:
 - 1) 1 set: Pivots.
 - 2) 1 each: Closer.
 - 3) 1 each: Locking Cylinder.
 - 4) 1 each: Exit Device with no dogging capability.
 - 5) 1 each: Kick Plate.
 - 6) 1 each: Pull.
 - 7) 1 each: Magnetic Hold Open (by Division 28).
- c. Inactive Leaf:
 - 1) 1 set: Pivots.
 - 2) 1 each: Closer.
 - 3) 1 each: Exit Device with no dogging capability.
 - 4) 1 each: Kick Plate.
 - 5) 1 each: Pull.
 - 6) 1 each: Magnetic Hold Open (by Division 28).

2.2 EXTERIOR DOORS

- A. Single Exterior Doors:
 - 1. **Group 2A:**
 - a. 1 set: Weatherstrip.
 - b. 1 each: Closer.
 - c. 1 each: Emergency Egress Exit Device (no exterior hardware or dogging capability).
 - d. 1 each: Exit Device Alarm Kit
 - e. 1 each: Cylinder for Alarm Kit
 - f. 1 each: Kick Plate.
 - g. 3 each: Hinges.
 - h. 1 each: Stop.
 - i. 1 each: Threshold.

2.3 INTERIOR DOORS

- A. Single Interior Doors:
 - 1. **Group 20F:**
 - a. 1 set: Smoke Gaskets. [Existing]
 - b. 3 each: Hinges. [Existing]
 - c. 1 each: Exit Device Keyed Lever Trim.
 - d. 1 each: Lockset Function F109.
 - e. 1 each: Stop.
 - f. 1 each: Kick Plate.
 - 2. **Group 20G:**
 - a. 1 set: Smoke Gaskets.
 - b. 1 each: Closer with hold open function. Restrict to 90 degree opening.
 - c. 3 each: Hinges.
 - d. 1 each: Exit Device Keyed Lever Trim.
 - e. 1 each: Lockset Function F109.
 - f. 1 each: Stop.
 - g. 1 each: Kick Plate.
 - 3. **Group 30B:**
 - a. 1 set: Smoke Gaskets [Existing to remain].
 - b. 1 each: Closer [Existing to remain].
 - c. 3 each: Hinges [Existing to remain].
 - d. 1 each: Kick Plate.
 - e. 1 each: Pull.
 - f. 1 each: Push.
 - g. 1 each: Stop.
 - h. Remove existing Latchset and strike plate

PART 3 - NOT USED

END OF SECTION

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

- A. Products Furnished But Not Installed Under This Section:
 - 1. Hollow metal frames.
- B. Related Requirements:
 - 1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for installation.
 - 2. Section 08 4113: 'Aluminum-Framed Entrances And Storefronts' for aluminum entry frames.

1.2 REFERENCES

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

1.3 SUBMITTALS

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

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Suppliers:
 - 1. Category Three Approved Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
 - a. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:
 - 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.
 - c. Midwest D-Vision Solutions, Salt Lake City, UT www.mwdsutah.com.
 - 1) Contact Information: Dan Mercer, office (801) 377-4355, cell (801) 618-9456, e-mail danm@mwdsutah.com.

- B. Manufacturers:
1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Any current member of Steel Door Institute.
- C. Frames:
1. Cold rolled furniture steel:
 - a. Interior Frames: 16 ga. (1.6 mm).
 - b. Exterior Frames: 14 ga. (1.9 mm).
 2. Provide labeled frame to match fire rating of door.
 3. Finish:
 - a. Use one of following systems:
 - 1) Prime surfaces with rust inhibiting primer.
 - 2) Galvanize.
 4. Anchors: 16 US ga (1.6 mm) minimum meeting UL or other code acceptable requirements for door rating involved.
- D. Fabrication:
1. General Requirements:
 - a. Frames shall be welded units. Provide temporary spreader on each welded frame.
 - b. Provide Manufacturer's gauge label for each item.
 - c. Make breaks, arrises, and angles uniform, straight, and true. Accurately fit corners.
 2. Frame width dimension:
 - a. Fabricate frame 1/8 inch (3 mm) wider than finished wall thickness as described in Contract Documents.
 3. Provide mortar guards at strikes and hinges.
 4. Anchors:
 - a. Provide three jamb anchors minimum for each jamb. On hinge side, install one anchor at each hinge location. On strike side, install one anchor at strike level and anchors at same level as top and bottom hinges. Tack weld anchors on frames intended for installation in framed walls.
 - b. Frames installed before walls are constructed shall be provided with extended base anchors in addition to other specified anchors.
 - c. Anchor types and configurations shall meet wall conditions.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 08 1313**HOLLOW METAL DOORS****PART 1 - GENERAL****1.1 SUMMARY**

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

1.2 REFERENCES

- A. Association Publications:
 - 1. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. HMMA 810-09, 'Hollow Metal Doors'.
 - b. HMMA 860-13, 'Guide Specifications For Hollow Metal Door and Frames'.
 - 2. Steel Door Institute:
 - a. SDI-108, 'Recommended Selection and Usage Guide for Standard Steel Doors'.
- B. Reference Standards:
 - 1. American Architectural Manufacturers Association / Window & Door Manufacturers Association / CSA Group:
 - a. AAMA/WDMA/CSA 101/I.S.2/A440-17, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.
 - 2. ASTM International:
 - a. ASTM A568/A568M-17a, 'Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for'.
 - b. ASTM A653/A653M-17, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
 - c. ASTM C1036-16, 'Standard Specification for Flat Glass'.
 - d. ASTM C1048-18, 'Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass'.
 - 3. Steel Door Institute:
 - a. SDI A250.8-2017, 'Specifications for Standard Steel Doors and Frames'.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Suppliers:
 - 1. Category Three Approved Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
 - a. Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:
 - 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.
 - c. Midwest D-Vision Solutions, Salt Lake City, UT www.mwdsutah.com.

- 1) Contact Information: Dan Mercer, office (801) 377-4355, cell (801) 618-9456, e-mail danm@mwdsutah.com.

B. Manufacturers:

1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Any current member of Steel Door Institute.

C. Doors:

1. Meet one of following requirements:
 - a. Meet requirements of Steel Door Institute ANSI / SDI A250.8.
 - b. Commercial grade steel meeting requirements of ASTM A568/A568M, Class 1:
 - 1) Grade I for interior doors, Grade II for exterior doors.
 - 2) Model 1 Full Flush or Model 2 Seamless designs at Manufacturer's option.
 - 3) Type F, G, or L as required.
 - 4) Finish:
 - a) Interior doors primed or galvanized as per ASTM A653/A653M.
 - b) Exterior doors galvanized and primed as per ASTM A653/A653M.
2. Insulation: Insulate doors at exterior of main building sufficient to provide U-value of 0.10 maximum.

D. Fabrication:

1. General:
 - a. Mortise and reinforce doors for hinges and locks.
 - b. Reinforce doors for closers and other surface applied hardware.
 - c. Drill and tap on job.
 - d. Seams along vertical edges of door need not be filled.
 - e. Do not extend hinge cut out full width of door unless fill strip is inserted, weld filled, and ground smooth so no seam appears on back face plate.

2.2 SOURCE QUALITY CONTROL

A. Tests:

1. Verification of Performance:
 - a. Label each door as conforming to above required standards.

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 01 1100: 'Summary Of Work' for cores for High Security Cylinders are excluded from Contract and provided by Owner. This specification establishes quality of materials and installation of those items for information of Contractor, Architect, and Owner's Representatives.
 - 2. Section 06 1100: 'Wood Framing':
 - a. Pre-installation conference held jointly with Section 08 4113.
 - 3. Section 07 9213: 'Elastomeric Joint Sealant' for quality of sealants.
 - 4. Section 08 7103: 'Securing Devices' for furnishing of locking cylinders.
 - 5. Section 08 8100: 'Glass Glazing' for quality of glass glazing.
 - 6. Division 28: Coordinate installation of door alarm system components, devices and wiring.
 - 7. Division 26: 'Electrical' for power source, raceway, boxes, wiring for door alarm devices.

1.2 REFERENCES

- A. Association Publications:
 - 1. American Architectural Manufacturers Association (AAMA):
 - a. AAMA 501-15, 'Methods of Test for Exterior Walls'.
 - b. AAMA 609 & 610-15, 'Cleaning and Maintenance Guide for Architecturally Finished Aluminum' (combined documents).
 - c. AAMA SFM 1-14, 'Aluminum Store Front and Entrance Manual'.
 - d. AAMA 2605-17a, 'Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels'.
- B. Definitions:
 - 1. Glass Surface:
 - a. Insulated glass unit:
 - 1) Surface 1: Exterior surface of outer lite.
 - 2) Surface 2: Interspace-facing surface of outer lite.
 - 3) Surface 3: Interspace-facing surface of inner lite.
 - 4) Surface 4: Interior surface of inner lite.
 - b. Monolithic glass:
 - 1) Surface 1: Exterior surface.
 - 2) Surface 2: Interior surface.
- C. Reference Standards:
 - 1. American National Standards Institute / Builders Hardware Manufacturers Association:
 - a. ANSI/BHMA A156.19-2013, 'Power Assist & Low Energy Operated Doors'.
 - 2. ASTM International:
 - a. ASTM B221-14, 'Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes'.
 - b. ASTM B456-17, 'Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium'.

- c. ASTM B633-15, 'Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel'.
 - d. ASTM C920-18, 'Standard Specification for Elastomeric Joint Sealants'.
 - e. ASTM C1184-18, 'Standard Specification for Structural Silicone Sealants'.
 - f. ASTM E283-04(2012), 'Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen'.
 - g. ASTM E330/E330M-14, 'Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference'.
 - h. ASTM E331-00(2016), 'Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference'.
3. International Building Code (IBC) (2018 or most recent edition adopted by AHJ):
 - a. Chapter 10, 'Means of Egress'.
 - b. Chapter 16, 'Structural Design'.
 - 1) Section 1609 'Wind Loads'.
 4. International Code Council / American National Standards Institute:
 - a. ICC / ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.
 5. National Fenestration Rating Council (NFRC):
 - a. NFRC 100-2017, 'Procedure for Determining Fenestration Product U-factors'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 1. Participate in MANDATORY pre-installation conference as specified in Section 06 1100.
 - a. Schedule pre-installation conference one (1) week before scheduled installation of storefront system.
 - b. In addition to requirements of Section 01 3100, review following:
 - 1) Review rough opening requirements:
 - a) Make certain rough openings are within tolerances required for installation of factory-fabricated frames.
 - b) These dimensions have been agreed upon between Owner and Manufacturer and are shown on Standard Plan Drawings.
 - 2) Review rough opening requirements:
 - a) Existing Building:
 - (1) Field verify rough openings before fabrication of storefront entrances.
 - 3) Review installation scheduling, coordination, placement of doors.
 - 4) Review low-energy door operator location and requirements.
 - 5) Review delivery, storage, and handling requirements.
 - 6) Review 'Examination' requirements before sliding door installation.
 - 7) Review 'Finish' door and hardware requirements.
 - 8) Review 'Protection' responsibilities.
 - 9) Review 'Cleaning' responsibilities.

1.4 SUBMITTALS

- A. Action Submittals:
 1. Product Data:
 - a. Manufacturer's literature.
 - 1) Storefront entry system.
 - b. Color and finish.
 2. Shop Drawings:
 - a. Clearly mark components to identify their location in Project.
 - b. Show locations, sizes, etc, of hardware reinforcing.
- 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) Low-energy door operator.
 - c. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature or cut sheets for storefront system and for each item of hardware.
 - b) Manufacturer's literature of cut sheets for low-energy door operators.
 - c) Color and finish selections.
 - d) Parts lists.

1.5 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 (.00003 m³/sm²)** of wall area at **6.24 PSF (300 Pa)** 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 (384 Pa)** 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 (384 Pa)**.
 - 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 (3 mm)** at center point, or **1/16 inch (1.58 mm)** 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 (82 deg C)**.
 - 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.
- 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 firm experienced in manufacturing systems that are similar to those indicated for this project and have 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 have 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.

1.6 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.

1.7 WARRANTY

- A. Manufacturer Warranty:
 - 1. Storefront Entrances:
 - a. Manufacturer's Warranty to be free of defects in material and workmanship.
 - b. Manufacturer's Warranty against deterioration or fading.
 - c. Manufacturer's Lifetime Warranty for Door Construction for normal use.
 - 2. Closers:
 - a. Closer Manufacturer's standard warranty, 10 years minimum.
 - 3. Low-Energy Door Operator:
 - a. Manufacturer's standard warranty.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

- A. Manufacturers:
 - 1. Category Three 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) Sills:
 - a) Match height of door bottoms.
 - 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 (50 mm) Sightline:
 - a) Double Stack header at exterior doors only if shown on Contract Drawings.
 - b) Single Glazed:
 - (1) AR450 by Arcadia.
 - (2) Trifab VG 450 by Kawneer.
 - c) Double Glazed:
 - (1) AG451 by Arcadia.
 - (2) Trifab VG 451 by Kawneer.
2. Manually Operated Doors:
 - a. Aluminum:
 - 1) 6063-T6 aluminum alloy or meet requirements of ASTM B221, alloy GS 10a T6.
 - b. Stiles:
 - 1) 3-1/2 inches by 1-3/4 inches by 0.125 inches (89 mm by 45 mm by 3.175 mm) thick nominal.
 - c. Top Rails:
 - 1) 3-1/2 inches minimum by 1-3/4 inches by 0.125 inches (89 mm minimum by 45 mm by 3.175 mm) thick nominal.

- d. Bottom Rails:
 - 1) 10 inches minimum by 1-3/4 inches by 0.125 inches (254 mm minimum by 45 mm by 3.175 mm) thick nominal.
 - e. Construction:
 - 1) Manufacturer's standard.
 - f. Glazing Stops:
 - 1) Snap-in type with neoprene bulb-type glazing. Units shall be glazed from exterior side.
 - g. Weatherstripping:
 - 1) Neoprene bulb-type.
 - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Peri-Plus Seal (PPS) by Arcadia.
 - b) Sealair by Kawneer.
 - h. Framing System Gaskets and Sealants:
 - 1) Manufacturer's standard, recommended by manufacturer for joint type:
 - 2) Sealants: As specified in Framing Components and Accessories.
 - i. Factory Finishing:
 - 1) Clear Anodized Aluminum Finish (match existing):
 - 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.
 - j. 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 C 920 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.
 - 3) 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.
4. Hardware:
- a. Hinging:
 - 1) Top and bottom offset, ball bearing pivots per door leaf.
 - b. Overhead Door Closers:
 - 1) Provide parallel arms on closers unless door position requires otherwise.
 - 2) Where possible, closers shall allow for 180 degree opening and not be used as stop. Provide Cush-N-Stop or equivalent arm where wall stop cannot be used.
 - 3) Adjust closers to provide maximum opening force as required by governing code authority.
 - 4) Closers shall have following features:
 - a) Adjustable sweep speed.

- b) Adjustable backcheck.
 - c) Non-handed, non-sized.
 - d) Cush arm by LCN or equal by Norton.
 - 5) Category Four Approved Products. See Section 01 6200 for definitions of Categories.
 - a) Surface mounted:
 - b) 4041 Series parallel arm by LCN.
 - c) 7500 Series Parallel arm by Norton.
 - c. Exit Devices:
 - 1) Emergency Egress Exit Doors:
 - a) Operation:
 - (1) Exit only with no dogging.
 - (2) Exterior Trim: None.
 - (3) Type: Rim Type with type of strike that will allow installation of specified panic devices on storefront system specified.
 - 2) Color:
 - a) Equivalent to clear anodized.
 - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Apex Series by Precision.
 - b) 80 Series by Sargent.
 - c) 98 or 99 Rim Series by Von Duprin.
 - d. Thresholds:
 - 1) None
 - e. Push / Pulls:
 - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) PBR and OPR-9 by Arcadia.
 - b) Kawneer CP and CO-9, clear anodized.
 - f. High Security Cylinders And Cores:
 - 1) Coordinate to match cylinders and cores in the building.
 - g. Kick Plates:
 - 1) Push side of Door only.
 - 2) 10 inches (254 mm) high by width of door less 3/4 inch (19 mm) on each side.
 - 3) Material: 0.050 inch (1.27 mm) thick Stainless Steel.
 - 4) 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 bidding. See Section 01 6200.
- 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.

F. Hardware Finishes:

1. Finishes for steel, brass, or bronze hardware items shall be satin chromium plated.
2. Materials other than steel, brass, or bronze shall be finished to match the appearance of satin chromium plated.

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 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 and Owner in writing if framed openings are not as agreed upon.
 - a. Do not install storefront entry and window frames until deficiencies in framed openings have been corrected to allow installation of standard entries and windows.
 - 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 (3 mm)** in **12 feet (3.6 meters)**; **1/4 inch (6 mm)** over total length.
 2. Offset from Alignment: For surfaces abutting in line, limit offset to **1/16 inch (1.6 mm)**.
 3. Offset at Corners: For surfaces meeting at corner, limit offset to **1/32 inch (0.8 mm)**.
 4. Diagonal measurements: Limit difference between diagonal measurements to **1/8 inch (3 mm)**.

- C. Install doors without warp or rack. Adjust doors and hardware to provide ninety (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. Interior Corridor Glazing: Clear.

3.4 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
 - 1. Pull test doors, especially pairs of single doors separated by permanent mullions, to ensure security of opening.
 - 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.

3.5 ADJUSTING

- A. Adjust swing 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 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 08 0601: 'Hardware Group and Keying Schedules'.
 - 3. Section 08 4113: 'Aluminum-Framed Entrances and Storefronts' for storefront hardware.

1.2 REFERENCES

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

1.3 ADMINISTRATIVE REQUIREMENTS

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

1.4 SUBMITTALS

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

B. Closeout Submittals:

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

1.5 DELIVERY, STORAGE, AND HANDLING**A. Storage And Handling Requirements:**

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

PART 2 - PRODUCTS**2.1 SUPPLIERS****A. Existing Projects (Doors and Door Hardware):**

1. USA Projects:
 - a. Category Three Approved Suppliers. See Section 01 6200 for definitions of Categories:
 - 1) Architectural Building Supply, Salt Lake City, UT www.cookandboardman.com:
 - 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.
 - 3) Midwest D-Vision Solutions, Salt Lake City, UT www.mwdsutah.com.
 - a) Contact Information: Dan Mercer, office (801) 377-4355, cell (801) 618-9456, e-mail danm@mwdsutah.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

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

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

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Hager Companies, St Louis, MO www.hagerhinge.com.
 - b. Ives, New Haven, CT www.iveshardware.com.
 - c. McKinney, Scranton, PA www.mckinneyhinge.com.
 - d. PBB, Ontario, CA www.pbbinc.com.
 - e. Stanley (dormakaba Americas), Indianapolis IN www.stanleyhardwarefordoors.com/products/.
- B. Hinges:
 - 1. Doors:
 - a. Sizes:
 - 1) Non-Fire-Rated Doors:
 - a) **1-3/8 inch** wood or metal doors: **3-1/2 inches by 3-1/2 inches**.
 - 2. Use non-removable pins on exterior opening doors.
 - 3. Hinges on exterior doors shall be solid brass, plated to achieve specified finish.
 - 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a. 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**

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

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

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

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

e) 5300LN Series with Augusta (AU) Lever by Yale.

D. Exit Devices:

1. Use operable lever trim.
2. Provide labeled hardware where required by local code authority.
3. No dogging capability
4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Apex Series by Precision.
 - b. 80 Series by Sargent.
 - c. 99 or 98 Series by Von Duprin.
 - d. 7100 Series by Yale.
5. Exit Device Alarm Kit:
 - a. Install at exterior door only.
 - b. Design Criteria:
 - 1) Same manufacturer compatible with exit devices above.
 - 2) Battery Powered Alarm Kit with audible low battery indicator
 - 3) Provide mortise cylinder compatible with device and keying in the building.
 - 4) Tamper resistant
 - c. Provide manufacturer's standard touch bar warning decal or custom install with wording:
 - 1) "!!EMERGENCY EXIT ONLY!! PUSH TO OPEN ALARM WILL SOUND"
 - d. Acceptable Products:
 - 1) Precision Hardware ALK-3 689
 - 2) Sargent 541-1 Alarm Option Kit AL-80
 - 3) Von Duprin 33/99ALK
 - 4) Yale Alarm Kit "A"

PART 3 - NOT USED

END OF SECTION

SECTION 08 7104**OPERATING TRIM****PART 1 - GENERAL****1.1 SUMMARY**

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

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Standard Door Push / Pulls:
 - 1. Size: **15 inches (380 mm)** by **3-1/2 inch (89 mm)**.
 - 2. Type Two Acceptable Products:
 - a. PS3515, PL3515 / 80301 by Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
 - 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**

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

- A. Products Furnished But Not Installed Under This Section:
 - 1. Closers for hollow metal 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. 8900 Series by Dorma Architectural Hardware, Reamstown, PA www.dorma.com/usa.
 - b. 1461 Series by LCN Closers, Princeton, IL www.lcnclosers.com.
 - c. 8501 Series by Norton Door Controls, Charlotte, NC www.nortondoорcontrols.com.
 - d. 1431 Series by Sargent, New Haven, CT www.sargentlock.com.
 - e. D-3550/D-3551 Series by Stanley (dormakaba Americas), Indianapolis IN www.stanleyhardwarefordoors.com/products/.
- 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. 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. Wall stop or Floor stop is specified in Door Schedule and Section 08 7108, 'Stops And Holders'.
 - b. Closers shall have following features:
 - 1) Adjustable sweep speed.
 - 2) Adjustable backcheck.
 - 3) Non-handed, non-sized.
 - 4. 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.

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 (1.27) mm thick Stainless Steel.
 - 2. Sizes:
 - a. Kick Plates: 10 inches (255) mm high by width of door less 3/4 inch (19 mm) on each side.

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

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SECTION 08 7108

STOPS AND HOLDERS

PART 1 - GENERAL

1.1 SUMMARY

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

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
 - 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.

PART 3 - EXECUTION

3.1 INSTALLATION

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

END OF SECTION

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

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

1.2 REFERENCES

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

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Hager, St Louis, MO www.hagerhinge.com.
 - b. NGP - National Guard Products, Memphis, TN www.ngpinc.com.
 - c. Pemko Manufacturing, Ventura, CA www.pemko.com.
- B. Sweepstrip (metal door bottom):
 - 1. Clear anodized aluminum with black neoprene insert.
 - 2. Reduce infiltration of air, wind, dust, rain, and snow.
 - 3. Meet UL requirements.
 - 4. For use with saddle thresholds.
 - 5. Type One Acceptable Products:

- a. 750S CLR by Hager.
 - b. 198N A by NGP.
 - c. 321 CN by Pemko.
 - d. Equal as approved by Architect before bidding. See Section 01 6200.
- C. Thresholds:
- 1. Type One Acceptable Products:
 - a. Design Criteria:
 - 1) Meet handicap accessibility requirements (ADA):
 - b. Out swinging metal exterior doors:
 - 1) 8426 by NGP.
 - 2) 253 x 3 FG by Pemko.
 - c. Equals as approved by Architect before bidding. See Section 01 6200.
- D. 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 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. Section 08 4113: 'Aluminum-Framed Entrances And Storefronts' for furnishing and installing of glazing in aluminum-framed storefront.

1.2 REFERENCES

A. Definitions:

1. Glass Surface:

a. Insulated glass unit:

- 1) Surface 1: Exterior surface of outer lite.
- 2) Surface 2: Interspace-facing surface of outer lite.
- 3) Surface 3: Interspace-facing surface of inner lite.
- 4) Surface 4: Interior surface of inner lite.

b. Monolithic glass:

- 1) Surface 1: Exterior surface.
- 2) Surface 2: Interior surface.

2. Insulated Glass: Two pieces of glass spaced apart and hermetically sealed to form single-glazed unit with air space between. Heat transmission through this type of glass may be as low as half that without air space. Also called double glazing, double pane, insulated unit, and thermal pane.
3. Laminated Glass: Two or more sheets with inner layer of transparent plastic to which glass adheres if broken. Used for overhead, safety glazing, and sound reduction.
4. Low-Emissivity Glass (Low-E): Reduces wintertime heat loss from interior with thin, almost colorless metallic coating that reflects heat back inside structure. Allows moderate solar heat gain while reducing harmful ultraviolet light in any season. Minimizes summertime air conditioning loss by reflecting radiated heat to outside. May be tempered for where safety glass is required. Available in single strength clear, gray and bronze (brown) color.
5. Shading Coefficient: Ratio of solar heat gain passing through a glazing system to solar heat gain that occurs under the same conditions if the window was made of clear, unshaded double strength glass. Lower SC number, the better solar control efficiency of glazing system.
6. Solar Heat Gain Coefficient (SHGC): Ratio of total solar heat passing through a given window relative to the solar heat incident on the projected window surface at normal solar incidence. (Percentage of solar energy directly transmitted or absorbed and re-radiated into a building). Lower SHGC, the better it is able to reduce heat.
7. Solar Reflectance (R): Percent of incident solar radiation that is reflected by window film/glass system. Lower the number, the less solar radiation reflected.
8. Tempered Glass: Glass strengthened through process of heating, creating tensile strength that causes glass to resist breakage, yet disintegrate into small pieces if break occurs. Tempered glass is type of safety glass.
9. U-Value: Measurement of heat transfer through film due to outdoor/indoor temperature differences. Lower U-value, less heat transfers. When using performance data, the lower U-value, better insulating qualities of window film/glass system.
10. Visible Light Transmitted (VLT): Percent of total visible light (380-780 nanometers) that passes through glass. Lower the number, the less visible light transmitted.

- B. Reference Standards:
 - 1. American National Standards Institute:
 - a. ANSI Z97.1-2009, 'Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test'.
 - 2. ASTM International:
 - a. ASTM C1036-16, 'Standard Specification for Flat Glass'.
 - b. ASTM C1048-18, 'Standard Specification for Heat-Treated Flat Glass - Kind H, Kind FT Coated and Uncoated Glass'.
 - c. ASTM C1172-14, 'Standard Specification for Laminated Architectural Flat Glass'.
 - d. ASTM C1281-16, 'Standard Specification for Preformed Tape Sealants for Glazing Applications'.
 - e. ASTM E2190-10, 'Standard Specification for Insulating Glass Unit Performance and Evaluation'.
 - 3. Consumer Products Safety Commission (CPSC):
 - a. 16 CFR, Part 1201 CAT 1 and 11, 'Safety Standard for Architectural Glazing Materials'.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's data sheets for each glass product and glazing material.
- 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. Warranty Documentation:
 - 1) Final, executed copy of Warranty.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Glazing shall 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.

1.5 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.

1.6 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.

1.7 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. Vitro Architectural Glass (formerly PPG glass), Cheswick, PA www.ppgglass.com or PPG Canada Ltd, Glass Division, Toronto, ON (416) 789-3331.

B. Storefront Glazing:

1. Thickness: **1/4 inch (6 mm)**.
2. Glazing shall have following characteristics:
 - a. Glazing Below Door Height and where shown in Contract Documents:
 - 1) Design Criteria:
 - a) Tempered.
 - b) Meet requirements of ASTM C1048, Kind FT, Condition A, Type I, Class I, Quality Q3.

C. Fabrication:

1. Except where glass exceeds **66 inches (1 675 mm)** in width, cut clear glass so any wave will run horizontally when glazed.

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

DIVISION 09: FINISHES

09 0100 MAINTENANCE OF FINISHES

09 0193 REFINISHING INTERIOR CLEAR-FINISHED HARDWOOD

09 2000 PLASTER AND GYPSUM BOARD

09 2900 GYPSUM BOARD

09 5000 CEILINGS

09 5116 ACOUSTICAL TILE CEILINGS

09 7000 WALL FINISHES

09 7226 SISAL WALL COVERINGS

09 9000 PAINTS AND COATINGS

09 9001 COMMON PAINTING AND COATING REQUIREMENTS
09 9111 EXTERIOR PAINTED ALUMINUM
09 9112 EXTERIOR PAINTED FERROUS METAL
09 9113 EXTERIOR PAINTED GALVANIZED METAL
09 9123 INTERIOR PAINTED GYPSUM BOARD, PLASTER
09 9124 INTERIOR PAINTED METAL
09 9125 INTERIOR PAINTED WOOD
09 9324 INTERIOR CLEAR-FINISHED HARDWOOD
09 9413 INTERIOR TEXTURED FINISHING

END OF TABLE OF CONTENTS

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SECTION 09 0193**REFINISHING INTERIOR CLEAR FINISHED HARDWOOD****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Preparing and refinishing following existing interior clear finished hardwood as described in Contract Documents:
 - a. Casework.
 - b. Standing and Running Trim.
- B. Related Requirements:
 - 1. Section 09 9001: Common Painting Requirements.

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Description:
 - 1. Use MPI(r) RIN 6.3E Polyurethane Varnish Finish system. Substitution of lacquer for specified products and systems is not allowed under any circumstances.
- B. Performance:
 - 1. Design Criteria:
 - a. Gloss / Sheen Level Required: Gloss Level 6 or 7.
- C. Materials:
 - 1. Products listed in edition of MPI Approved Product List current at time of bidding are approved, providing they meet VOC requirements in force where Project is located.
 - 2. Stain: MPI Product 90.
 - 3. Finish Coats: MPI Product 56.

PART 3 - EXECUTION**3.1 APPLICATORS**

- A. Acceptable Applicators:
 - 1. Brandon's Majestic Interiors, Heber City, UT.
 - a. Contact information: Brandon, (801) 404-1825, e-mail brandon@majesticinteriors.net.
 - 2. Church Interiors Inc., Charlotte, NC www.churchinteriors.com.
 - a. Contact information: phone (800) 289-7397.
 - 3. Church Specialties Inc., Pleasant Grove, UT:
 - a. Contact information: Nathan Bishop, phone (801) 830-0376, fax (866) 430-0650, e-mail Nate_csi@icloud.com.
 - 4. Commercial Furnishings, LLC, Orem, UT www.commercialfurnishingsllc.com.
 - a. Contact information: Aaron, (801) 319-5814, email aaron@commercialfurnishingsllc.com.
 - 5. Harris Restoration & Upholstery Inc, Orem UT www.harrisupholstery.com.
 - a. Contact Information: email harris.restoration@gmail.com.
 - 6. Mobile Restoration Services, Pleasant Grove, UT:
 - a. Contact Information: (801) 368-1493, email mobilerestorationservices@gmail.com.

7. Equal as approved by Architect before bidding. See Section 01 4300.

3.2 EXAMINATION

A. Site Verification of Conditions:

1. Using existing wood element that is not to be re-used, apply finish as specified for existing work.
 - a. Notify Architect immediately with preliminary results of testing.
 - b. Within four calendar days of test, meet with Architect and finish applicator to evaluate test results and performance of specified finish system. If specified system is not satisfactory, revised finish system will be determined and specified.

3.3 APPLICATION

A. General:

1. See appropriate paragraphs of Section 09 9001.

B. Touch-up And Recoat:

1. Sand with fine sandpaper to remove gloss, scratches, and blemishes.
2. Clean surfaces with mild soap and water. Etch with tri-sodium phosphate (TSP).
3. Patch scratches and gouges and stain as necessary to match adjacent wood.
4. Apply two coats of Urethane using professional spray equipment.

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, except behind ceramic tile.
 - 2. Furnish and install acoustical sealants as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 09 9413: 'Interior Textured Finishing'.

1.2 REFERENCES

- A. Definitions:
 - 1. Accessories: Metal or plastic beads, trim, or moulding used to protect or conceal corners, edges, or abutments of the gypsum board construction.
 - 2. Drywall Primer: Paint material specifically formulated to fill the pores and equalize the suction difference between gypsum board surface paper and the compound used on finished joints, angles, fastener heads, and accessories and over skim coatings.
 - 3. Skim Coat: Either a thin coat of joint compound trowel applied, or a material manufactured especially for this purpose and applied in accordance with manufacturer's recommendations, over the entire surface.
 - 4. Texturing: Regular or irregular patterns typically produced by applying a mixture of joint compound and water, or proprietary texture materials including latex base texture paint, to a gypsum board surface previously coated with drywall primer.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C11-16, 'Standard Terminology Relating to Gypsum and Related Building Materials and Systems'.
 - b. ASTM C475/C475M-15, 'Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board'.
 - c. ASTM C840-17, 'Standard Specification for Application and Finishing of Gypsum Board'.
 - d. ASTM C1002-16, 'Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs'.
 - e. ASTM C1047-14a, 'Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base'.
 - f. ASTM C1178/C1178M-13, 'Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel'.
 - g. ASTM C1396/C1396M-14a, 'Standard Specification for Gypsum Board'.
 - h. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
 - i. ASTM E90-09(2016), 'Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements'.
 - j. ASTM E119-16a, 'Standard Test Method for Fire Tests of Building Construction and Materials'.
 - k. ASTM E413-16, 'Classification for Rating Sound Insulation'.
 - 2. Gypsum Association:
 - a. GA-214-15, 'Recommended Levels of Gypsum Board Finish'.

- b. GA-216-16: 'Application and Finishing of Gypsum Panel Products'.
 - c. GA-600-15, 'Fire Reference Design Manual'.
 - d. GA-801-07, 'Handling and Storage of Gypsum Panel Products: A Guide for Distributors, Retailers, and Contractors'.
3. International Building Code (IBC) (2015 or latest approved version):
 - a. Chapter 25, 'Gypsum Board And Plaster'.
 4. National Building Code of Canada / Underwriters Laboratories of Canada:
 - a. CAN/ULC-S102: 'Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies' (7th Edition).
 5. Underwriters Laboratories, Inc.
 - a. UL 263: 'Test Method for Fire Tests of Building Construction and Materials' (14th Edition).
 - b. UL 723: 'Test for Surface Burning Characteristics of Building Materials; (10th Edition).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 1. Schedule MANDATORY pre-installation conference immediately before installation of gypsum wallboard.
 2. In addition to agenda items specified in Section 01 3100, review following:
 - a. Finish requirements necessary for installation of finish materials over gypsum wallboard, and location and installation of ceramic tile backerboard.

1.4 SUBMITTALS

- A. Informational Submittals:
 1. Test And Evaluation Reports:
 - a. Fire test results or assembly diagrams and numbers confirming products used will provide required fire ratings with installation configurations used.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. General:
 1. Following recommendations of GA-801 Guide for Handling and Storage of Gypsum Panel Products unless local, state or federal laws or agency rules differing from the recommendations shall take precedence.
- B. Delivery And Acceptance Requirements:
 1. Deliver materials in original packages, containers, or bundles bearing brand name, applicable standard designation, and Manufacturer's name.
- C. Storage And Handling Requirements:
 1. Store material under roof and keep dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack gypsum board flat to prevent sagging.

1.6 FIELD CONDITIONS

- A. Ambient Conditions:
 1. Comply with ASTM C840 or GA-216 requirements, whichever are more stringent:
 - a. Do not install interior products until installation areas are enclosed and conditioned.
 - 1) Temperature shall be 50 deg F (10 deg C) and 95 deg F (35 deg C) maximum day and night during entire joint operation and until execution of Certificate of Substantial Completion.
 - 2) Provide ventilation to eliminate excessive moisture.

- 3) Avoid hot air drafts that will cause too rapid drying.
- b. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturers:

1. Manufacturer Contact List:
 - a. American Gypsum, Dallas, TX www.americangypsum.com.
 - 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 (15.9 mm)**.

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.
 - g. Wm. Zinsser & Co, Somerset, NJ www.zinsser.com.
2. Gypsum Board Mounting Accessories:
 - a. Resilient Sound Isolation Clips:
 - 1) Design Criteria:
 - a) Sound Transmission: As per ASTM E90 and E413:
 - 2) Type Two Acceptable Products:
 - (1) IsoMax by Kinetics Noise Control.
 - (2) SSP Clips by Soundproofing Co.
 - (3) Equal as approved by Architect before installation. See Section 01 6200.
 - b. Furring Channels:
 - 1) Class Two Quality Standards. See Section 01 6200 for definitions:
 - a) Walls: Galvanized DWFC-25.
 - b) Ceilings: Galvanized DWFC-20.
 - 2) Accessories as required by Manufacturer's fire tests to provide necessary fire ratings.
 - c. Corner And Edge Trim:

- 1) Metal, paper-faced metal, paper-faced plastic, or solid vinyl meeting requirements of ASTM C1047. Surfaces to receive bedding cement treated for maximum bonding.
 - d. Control Joint:
 - 1) Bent zinc sheet with V-shaped slot, perforated flanges, covered with plastic tape meeting requirements of ASTM C1047.
 3. Joint Compound:
 - a. Best grade or type recommended by Board Manufacturer and meeting requirements of ASTM C475/C475M.
 - 1) Use Taping Compound for first coat to embed tape and accessories.
 - 2) Use Taping Compound or All-Purpose Compound for subsequent coats except final coat.
 - 3) Use Finishing Compound for final coat and for skim coat.
 4. Joint Reinforcing:
 - a. Paper reinforcing tape acceptable to Gypsum Board Manufacturer.
 5. Fasteners:
 - a. Bugle head screws meeting requirements of ASTM C1002:
 - 1) Gypsum Board:
 - a) Type W: For fastening gypsum board to wood members, of length to penetrate wood framing **5/8 inch (15.9 mm)** minimum.
 - b) Type S: For fastening gypsum board to steel framing and ceiling suspension members, of length to penetrate steel framing **3/8 inch (9.5 mm)** minimum.
- B. Primer / 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.
- C. Primer On Surfaces To Receive Wallcovering:
1. White, self-sizing, water based, all purpose wallcovering primer.
 2. Type Two Acceptable Products:
 - a. Shieldz Universal Pre-Wallcovering Primer by Wm. Zinsser and Company.
 - b. Equal as approved by Architect before application. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
1. Examine substrate and verify framing is suitable for installation of gypsum board.
 2. Examine gypsum board before installation. Reject panels that are wet, moisture damaged, and mold damaged.
 3. Notify Architect of unsuitable conditions in writing.
 - a. Do not install board over unsuitable conditions.
 4. Commencement of Work by installer is considered acceptance of substrate.

3.2 INSTALLATION

- A. Interface With Other Work:
1. Coordinate with Division 06 for location of backblocking for edges and ends of gypsum board and for blocking required for installation of equipment and building specialties.
 2. Do not install gypsum board until required blocking is in place.

- B. General: Install and finish as recommended in ASTM C840 or GA-216 unless specified otherwise in this Section.
- C. Mounting Accessories:
1. Furring Channels: Apply with screws through flanges into each framing member.
- D. Interior Gypsum Board:
1. General:
 - a. Install so trim and reinforcing tape are fully backed by gypsum board. No hollow spaces between pieces of gypsum board over **1/8 inch (3 mm)** wide before taping are acceptable.
 - b. Rout out backside of gypsum board to accommodate items that extend beyond face of framing, but do not penetrate face of gypsum board, such as metal door frame mounting brackets, etc.
 - c. On walls over **108 inches (2 700 mm)** high, apply board perpendicular to support
 - d. Butt edges in moderate contact. Do not force in place. Shim to level.
 - e. Leave facings true with joint, finishing flush. Vertical work shall be plumb and ceiling surfaces level.
 - f. Scribe work closely:
 - 1) Keep joints as far from openings as possible.
 - 2) If joints occur near an opening, apply board so vertical joints are centered over openings.
 - 3) No vertical joints shall occur within **8 inches (200 mm)** of external corners or openings.
 - g. Install board tight against support with joints even and true. Tighten loose screws.
 - h. Caulk perimeter joints in sound insulated rooms with specified acoustical sealant.
 2. Ceilings:
 - a. Apply ceilings first using minimum of two (2) men.
 - b. Use board of length to give minimum number of joints.
 - c. Apply board perpendicular to support.
 3. Fastening:
 - a. Apply from center of board towards ends and edges.
 - b. Apply screws **3/8 inch (9.5 mm)** minimum from ends and edges, **one inch (25 mm)** maximum from edges, and **1/2 inch (13 mm)** maximum from ends.
 - c. Spacing:
 - 1) Ends: Screws not over **7 inches (175 mm)** on center at edges where blocking or framing occurs.
 - 2) Wood Framed Walls And Ceilings: Screws **7 inches (175 mm)** on center in panel field.
 - 3) Metal Framed Walls: Screws **12 inches (300 mm)** on center in panel field.
 - d. Set screw heads **1/32 inch (0.8 mm)** below plane of board, but do not break face paper. If face is accidentally broken, apply additional screw **2 inches (50 mm)** away.
 - e. Screws on adjacent ends or edges shall be opposite each other.
 - f. Drive screws with shank perpendicular to face of board.
 4. Trim:
 - a. Corner Beads:
 - 1) Attach corner beads to outside corners.
 - a) Attach metal corner bead with staples spaced **4 inches (100 mm)** on center maximum and flat taped over edges of corner bead. Also, apply screw through edge of corner bead where wood trim will overlay corner bead.
 - b) Set paper-faced trim in solid bed of taping compound.
 - b. Edge Trim: Apply where gypsum board abuts dissimilar material. Hold channel and 'L' trim back from exterior window and door frames **1/8 inch (3 mm)** to allow for caulking.
 5. Finishing:
 - a. General:
 - 1) Tape and finish joints and corners throughout building as specified below to correspond with final finish material to be applied to gypsum board. When sanding, do not raise nap of gypsum board face paper or paper-faced trim.
 - 2) First Coat:
 - a) Apply tape over center of joint in complete, uniform bed of specified taping compound and wipe with a joint knife leaving a thin coating of joint compound. If

- metal corner bead is used, apply reinforcing tape over flange of metal corner bead and trim so half of tape width is on flange and half is on gypsum board.
- b) Completely fill gouges, dents, and fastener dimples.
 - c) Allow to dry and sand lightly if necessary to eliminate high spots or excessive compound.
- 3) Second Coat:
 - a) Apply coat of specified joint compound over embedded tape extending **3-1/2 inches (88 mm)** on both sides of joint center. Use finishing compound only if applied coat is intended as final coat.
 - b) Re-coat gouges, dents, and fastener dimples.
 - c) Allow to dry and sand lightly to eliminate high spots or excessive compound.
 - 4) Third Coat: Apply same as second coat except extend application **6 inches (150 mm)** on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
 - 5) Fourth Coat: Apply same as second coat except extend application **9 inches (425 mm)** on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
- a. Finishing Levels: Finish panels to levels indicated below and according to ASTM C840, GA-214 and GA-216:
 - 1) Gypsum Board Surfaces not painted or finished:
 - a) GA-214 Level 1: 'All joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable'.
 - 2) Gypsum Board Surfaces to Receive: Painted Texturing - Section 09 9413: 'Interior Textured Finishing':
 - a) GA-214 Level 4: 'All and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified primer'.
 - 3) Gypsum Board Surfaces to Receive: Smooth Gypsum Board Surfaces:
 - a) GA-214 Level 4: 'All and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified primer'.

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 5116**ACOUSTICAL TILE CEILINGS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install acoustical tile on backerboard as described in Contract Documents.
- B. Related Requirements:
1. Section 09 2900: 'Gypsum Board'.

1.2 REFERENCES

- A. Association Publications:
1. The Ceilings & Interior Systems Construction Association (CISCA), 405 Illinois Avenue, 2B, St Charles IL. www.cisca.org.
 - a. '*Ceiling Systems Handbook*': Recommendations for direct hung acoustical tile installation.
 - b. '*Production Guide*': Practical reference for ceiling systems and estimating costs.
- B. Definitions:
1. Absorption: Materials that have capacity to absorb sound. Absorption is the opposite of reflection.
 2. Ceiling Attenuation Class (CAC): Rates ceiling's efficiency as barrier to airborne sound transmission between adjacent closed offices. Shown as minimum value, previously expressed as CSTC (Ceiling Sound Transmission Class). Single-figure rating derived from normalized ceiling attenuation values in accordance with classification ASTM E413, except that resultant rating shall be designated ceiling attenuation class. (Defined in ASTM E1414.) Acoustical unit with high CAC may have low NRC.
 3. Class A: Fire classification for product with flame spread rating of no more than 25 and smoke developed rating not exceeding 50, when tested in accordance with ASTM E84 or UL 723.
 4. Flame Spread: The propagation of flame over a surface.
 5. Flame Spread Index: Comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time for a material tested in accordance with ASTM E84 or UL 723.
 6. Light Reflectance (LR): Percentage of light a surface reflected by ceiling surface expressed in decimal form.
 7. Noise Reduction Coefficient (NRC): Average sound absorption coefficient measured at four frequencies: 250, 500, 1,000 and 2,000 Hertz expressed to the nearest integral multiple of 0.05. Rates ability of ceiling or wall panel or other construction to absorb sound. NRC is fraction of sound energy, averaged over all angles of direction and from low to high sound frequencies that is absorbed and not reflected.
 8. Smoke-Developed Index: Comparative measure, expressed as a dimensionless number, derived from visual measurements of smoke obscuration versus time for a material tested in accordance with ASTM E84 or UL 723.
 9. Sound Absorption: Property possessed by materials and objects, including air, of converting sound energy into heat energy. Sound wave reflected by surface always loses part of its energy. Fraction of energy that is not reflected is called sound absorption coefficient of reflecting surface. For instance, if material reflects 80 percent of sound energy, then sound absorption coefficient would be 20 percent (0.20).
 10. Surface Burning Characteristic: Rating of interior and surface finish material providing indexes for flame spread and smoke developed, based on testing conducted according to ASTM Standard E84 or UL 723.

11. Textured Pattern: Granular or raised (fine, coarse, or a blend), felted or matted surface as an integral part of the basic product or superimposed on the product surface.

C. Reference Standards:

1. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE):
 - a. ASHRAE Standard 62.1-2013, 'Ventilation for Acceptable Indoor Air Quality'.
2. ASTM International;
 - a. ASTM D1779-98(2017), 'Standard Specification for Adhesive for Acoustical Materials'.
 - b. ASTM E84-18b, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
 - c. ASTM E795-16, 'Standard Practices for Mounting Test Specimens During Sound Absorption Tests'.
 - d. ASTM E1264-14, 'Standard Classification for Acoustical Ceiling Products'.
 - e. ASTM E1414/E1414-16, 'Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum'.
 - f. ASTM E1477 - 98a(2017), 'Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers'.
3. International Building Code (IBC) (2018 or latest approved Edition):
 - a. Chapter 8, 'Interior Finishes':
 - 1) Section 803, 'Wall And Ceiling Finishes':
 - a) 803.1.1, 'Interior Wall and Ceiling Finish Materials'.
 - b) 803.1.2, 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
4. National Fire Protection Association:
 - a. NFPA 101: 'Life Safety Code' (2018 Edition).
 - b. NFPA 265: 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls' (2015 Edition).
5. Underwriters Laboratories Inc.:
 - a. UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials' (Tenth Edition).

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:

1. Participate in pre-installation conference specified in Section 09 2900 to review finish requirements for gypsum wallboard ceilings.
2. Schedule acoustical tile ceiling pre-installation conference after installation of gypsum wallboard but before beginning installation of tile.
3. In addition to items specified in Section 01 3100, review following:
 - a. Verify that tile comes from same dye lot and has same dye lot code.
 - b. Review requirements of acceptable and non-acceptable tile.

1.4 SUBMITTALS

A. Action Submittals:

1. Samples:
 - a. One (1) sample of each variant of specified tile series.

B. Informational Submittals:

1. Certificates:
 - a. Installer(s):
 - 1) Provide each Installer's 'Certificate of Completion - Duratile' from Manufacture showing Name and completion date with bid to be included in closing documents for project.
 - a) Certificate is valid for two (2) years from date printed on Certificate before recertification is required.
2. Test And Evaluation Reports:
 - a. If requested by Owner, provide copies of Quality Assurance requirements for 'Class A' flame spread rating and 'Room-Corner Test'.

3. Manufacturer Installations:
 - a. Published installation recommendations.
 4. Qualification Statement:
 - a. Installer(s):
 - 1) Provide Qualification documentation unless waived by Owner.
- C. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation:
 - 1) Include final, executed copy of warranty.
 - b. Record Documentation:
 - 1) Manufacturers Documentation:
 - a) Manufacturer's literature on tile and adhesive.
 - b) Color and pattern selection.
 - 2) Installer(s) 'Certificate of Completion - Duratile' submitted at time of bid.
- D. Maintenance Material Submittals:
1. Extra Stock Materials:
 - a. Provide Owner with six (6) cartons of each type of tile with same dye lot code.

1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
1. Fire-Test-Response Characteristics: As determined by testing identical ceiling tile applied with identical adhesives to substrates according to test method indicated below by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Surface-Burning Characteristics:
 - 1) Ceiling tile shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
 - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
 - b) Flash point: None.
 2. Passage of 'Room-Corner Test' as recognized by AHJ, is required for system. Adhesive cited in test literature is required for installation of ceiling tile on Project.
 - a. Room Corner Tests:
 - 1) ASTM E84, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
 - 2) IBC 803.2.1, 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
 - 3) NFPA 265: 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
 - 4) UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'.
- B. Qualifications:
1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
 - a. Minimum five (5) years satisfactorily completed projects of comparable quality, similar size, and complexity including a minimum of three (3) years of experience in glue-up ceiling tile installations and shall have satisfactorily completed glue-up installation(s) within in past three (3) years before bidding.
 - b. Review, understand, and comply Installer Qualifications and submitted 'Duratile' published installation recommendations provided by Manufacturer:
 - 1) Contact Armstrong CSA customer service center at (800) 442-4212 to obtain and review compliance package on Duratile prior to bidding.
 - 2) This requirement may be waived by Owner, if Installer has previously complied with Installer Qualification requirements and can document at least two (2) satisfactorily completed projects of comparable size using Armstrong 12 inch x 12 inch (300 mm x 300 mm) ceiling tile for glue-up within past three (3) years prior to bidding.
 - 3) Installer shall note complete compliance with Qualification requirements on submitted bid form.
 - 4) Submit qualification documentation unless waived by Owner.

- c. Agree to complete and pass 'Duratile Personal Learning Module' (Certificate required for all Installer(s) for Church projects). Certification valid for two (2) years:
 - 1) Go to <http://www.armstrong.com/commceilingsna/#>.
 - 2) Click on My Armstrong Upper Right hand Corner.
 - 3) First time users: Click on 'Register' button and provide all appropriate information for username and password (you must register as a contractor to have access to 'ELearning System').
 - 4) Under My Armstrong Functions (left hand side), click on 'ELearning System'.
 - 5) Click on 'Duratile Video'.
 - 6) Watch video and take Quiz (10 questions). Passing grade required for certificate.
 - 7) Print Certificate.
 - 8) Certificate must be submitted with Bid.
 - 9) Submit 'Certificate of Completion - Duratile'. Required for all projects and may not be waived by Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:

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

B. Storage And Handling Requirements:

1. Store materials where protected from moisture, direct sunlight, surface contamination, and damage.
2. Store acoustic tile in cool, dry location, out of direct sunlight and weather, and at temperatures between **32 deg F (0 deg C)** and **86 deg F (30 deg C)**.
3. Store adhesive on site at installation temperature, between **65 and 90 deg F (18 and 32 deg C)**, for one week before installation.
4. Handle acoustical ceiling tiles carefully to avoid chipping edges or damage. Use no soiled, scratched, or broken material in the Work.

1.7 FIELD CONDITIONS

A. Ambient Conditions:

1. Building shall be enclosed, mechanical system operating with proper filters in place, and temperature and humidity conditions stabilized within limits under which Project will operate before, during, and after installation until Substantial Completion.
2. Temperature at time of setting tile shall be **50 deg F (10 deg C)** minimum and **100 deg F (38 deg C)** maximum.

1.8 WARRANTY

A. Manufacturer Warranty:

1. Provide Manufacturer's ten (10) year limited system warranty for the following:
 - a. Manufacturer's warranty to be free from defects in materials and factory workmanship.
 - b. Manufacturer's warranty against sagging and warping.
 - c. Manufacturer's warranty against mold/mildew, and bacterial growth.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:

1. Manufacturer Contact List:
 - a. Armstrong World Industries, Strategic Accounts, Lancaster, PA www.ceiling.com.

- 1) For pricing and ordering of tile, contact Sherry Brunt, Phyllis Miller, or Beth Rinehart at (800) 442-4212, or Armstrongcsa@armstrong.com.
 - 2) For Strategic Account information, contact Deborah Pickens at (480) 695-9053 dlpickens@armstrong.com.
 - b. Franklin International, Inc., Columbus, OH www.titebond.com.
- B. Materials:
1. Description:
 - a. Size: **3/4 inch (19 mm)** thick minimum by **12 inches (300 mm)** square.
 - b. Color: White.
 - c. Grid Face: Tile glue-up.
 - d. Surface Finish: Factory-applied.
 - e. Wet-formed high density mineral fiber.
 2. Design Criteria:
 - a. Meet requirements of ASTM E1264, Type III (mineral base with painted finish), Form 2 (water felted), Pattern CE (perforated, small holes – lightly textured), Fire Class A.
 - b. Acoustics:
 - 1) Noise Reduction Coefficient (Rating expressed according to ASTM E1284 requirements:
 - a) NRC rating: 60 minimum.
 - 2) CAC rating: 35 minimum.
 - c. Anti Mold / Mildew:
 - 1) Resistance against growth of mold/mildew.
 - d. Durable:
 - 1) Impact-resistant.
 - 2) Scratch-resistant.
 - e. Tongue and Groove.
 - f. Finish:
 - 1) Abuse-resistant/durable, factory applied vinyl latex paint.
 - g. Fire Performance:
 - 1) Panels meet ASTM E84 or UL 723 Type 1 surface burning characteristics.
 - h. High Recycled Content (HRC): Classified as containing greater than 50 percent total recycled content.
 - i. Light Reflectance (LR): 0.86 Average (Range of 0.84 to 0.88).
 - j. Sag Resistance:
 - 1) Resistance to sagging in high humidity conditions up to, but not including, standing water and outdoor applications.
 - k. Texture: Embossed texture with fine fissuring and small perforations with natural variation in texture and color appearance between tile.
 - l. VOC Emissions:
 - 1) Low formaldehyde: Contributing less than 13.5 ppb in typical conditions per ASHRAE Standard 62, 'Ventilation for Acceptable Indoor Air Quality'.
 3. Acoustic Tile:
 - a. Category Three Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Duratile Item No. MN80377 by Armstrong.
- C. Accessories:
1. Adhesive:
 - a. Description:
 - 1) For use on acoustical ceiling tiles.
 - b. Design Criteria:
 - 1) Meet requirements of ASTM D1779.
 - 2) Meet NFPA Class A fire rating when tested in accordance with ASTM E84.
 - 3) Fast grab and 'no sag' installation.
 - 4) Water cleanup.
 - 5) Not recommended for use on tiles larger than **12 inch x 12 inch (305 mm x 305 mm)**.
 - c. Type Two Acceptable Products:
 - 1) Titebond No. 2704 Solvent Free Acoustical Ceiling Tile Adhesive by Franklin International.

- 2) Highest quality of adhesive from manufacturer recommended by Tile Manufacturer as approved by Architect before use. See Section 01 6200.
2. Edge Molding:
 - a. Steel 'U' molding with baked enamel finish.
 - b. Type Two Acceptable Products:
 - 1) 7843 Series by Armstrong.
 - 2) Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
 1. Inspect for defects in backing and support that are not acceptable.
 - a. Examine areas around HVAC diffusers and light fixtures for tile installation problems.
 - b. Examine ceiling for levelness. Cisca 'Code of Practice' requires ceiling to be free of irregularities and be level to within 1/4 inch (6 mm) in 12 foot (305 mm).
 - c. Examine substrate for any problems that will compromise adhesion of ceiling tile.
 2. Notify Architect in writing of unacceptable conditions.
 3. Do not apply ceiling tile until defects in backing and support are corrected.

3.2 PREPARATION

- A. Surface Preparation:
 1. Follow Manufacturer recommendations for surface preparation:
 - a. Substrate must be clean, free of grease and dirt, sound, smooth, even and level before applying tile to surface.
 - 1) Do not install new ceiling tile over old glue globs or bad substrate with any surface finish that is incompatible with tile adhesive.
 - b. Painted Surfaces: Avoid applying tile to newly painted ceiling.
 - c. Materials shall be dry and clean at time of application.

3.3 INSTALLATION

- A. Special Techniques:
 1. Installation shall be in accordance with Manufacturer's recommendations:
 - a. Do not install tile when room temperature exceeds or below recommended ambient conditions.
 - b. Tile is directional tile and must be installed in same direction of pattern running parallel to long dimension of each room.
 - c. Remove loose dust from back of tile and ceiling where adhesive is to be applied.
 - d. Prime 3 inch (75 mm) minimum circle near each corner by buttering very thin coat of adhesive.
 - e. Apply daub of adhesive to each corner. Daubs will be of sufficient size to form a circle 2-1/2 to 3 inches (63 to 75 mm) in diameter and 1/8 to 1/4 inch (3 to 6 mm) thick when tile is pressed firmly in place. Do not apply daubs so far in advance of installation that adhesive skins over.
 - f. Do not bend tile during installation.
 2. Tile Layout:
 - a. Lay out tile symmetrically about center lines of room.
 - b. Lay out so tiles at room perimeters are at least 1/2 full tile size.
 - c. Leave tile in true plane with straight, even joints.
 - d. Tile joints shall be straight and in alignment, and exposed surface flush and level.
 - e. Furnish and install specified molding wherever tile has exposed edges or abuts walls, columns, and other vertical surfaces, except at curves of 3 inch (75 mm) radius or smaller.

- f. Cut around penetrations that are not to receive moldings cleanly with sharp knife and at a slight angle away from cutout.
3. Ceiling mounted items:
 - a. Locate light fixtures, speakers, and mechanical diffusers and grilles symmetrically in room and centered on tile centers or tile joints insofar as possible, unless shown otherwise.
 - b. Keep method of locating ceiling mounted items as consistent as possible throughout building.
 - c. Ceiling mounted item location method within each room shall always be consistent.

3.4 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
 1. Acoustical Tile. The following have been identified by the Manufacturer as tile defects, should not be installed, and will be replaced at no charge to Owner. Manufacturer will replace any material that does not meet product specifications. Installer to call 1 (800) 442-4212 immediately to report any tile discrepancies:
 - a. Obvious Tile Defects:
 - 1) Gross surface defects or damage.
 - 2) Gross damage to edges and corners.
 - 3) Bevels without paint.
 - b. Size Measurement:
 - 1) Tiles measure **12 inches (305 mm)**, plus or minus **1/32 inch (0.8 mm)**, measured across center of two (2) parallel sides.
 - c. Squareness Measurement:
 - 1) Measure two (2) diagonals of an individual ceiling tile.
 - 2) Diagonal measurements need to be within **1/16 inch (1.6 mm)** of each other. No more than **1/16 inch (1.6 mm)** difference.
 - d. Warp:
 - 1) Tiles specification is plus or minus **0.050 inch (1.27 mm)** as measured in the center of tile.
 2. Installer:
 - a. Substrate preparation and installation of ceiling tile not following CISCA Code of Practice will be unacceptable and considered defective and subject to replacement at no cost to Owner.

3.5 ADJUSTING

- A. 'Touch-up' minor abraded surfaces.

3.6 CLEANING

- A. Remove from site debris connected with work of this Section.

END OF SECTION

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SECTION 09 7226**SISAL WALL COVERING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnishing and installing wall covering 'Type A' (Sisal) as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 06 4512: 'Architectural Woodwork Wood Trim' for wood trim for sisal wall covering.
 - 2. Section 09 2900: 'Gypsum Board' for priming of gypsum board.

1.2 REFERENCES

- A. Definitions:
 - 1. Class A: Fire classification for product with flame spread rating of no more than 25 and smoke developed rating not exceeding 50, when tested in accordance with ASTM E84 or UL 723.
 - a. Flame Spread: The propagation of flame over a surface.
 - b. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.
 - c. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.
 - d. Surface Burning Characteristic: Rating of interior and surface finish material providing indexes for flame spread and smoke developed, based on testing conducted according to ASTM Standard E84 or UL 723.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM E84-18, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
 - 2. International Building Code (IBC) (2015 or latest approved edition):
 - a. Chapter 8, 'Interior Finishes':
 - 1) Section 803, 'Wall And Ceiling Finishes':
 - a) 803.1.3, 'Room Corner Test for Textile Wall Coverings and Expanded Vinyl Wall Coverings'.
 - b) 803.1.4, 'Acceptance Criteria for Textile and Expanded Vinyl Wall Coverings Tested to ASTM E84 or UL 723'.
 - 3. National Fire Protection Association:
 - a. NFPA 101: 'Life Safety Code' (2015 Edition).
 - b. NFPA 265: 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls', (2015 Edition).
 - 4. Underwriters Laboratories, Inc.:
 - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (2010 - Tenth Edition).

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature or cut sheet.
 - b. Maintenance instructions.
 - c. Color and pattern selection.

- B. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. Copies of Quality Assurance requirements for 'Class A' flame spread rating and 'Room-Corner Test'.
 - 2. Qualification Statement:
 - a. Installer:
 - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Cleaning and maintenance instructions.
 - b. Record Documentation:
 - 1) Manufacturers Documentation:
 - a) Manufacturer's literature or cut sheets.
 - b) Color and pattern selections.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Surface-Burning Characteristics:
 - 1) Wall covering shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
 - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
 - b) Flash point: None.
 - 2. Passage of 'Room-Corner Test' as recognized by AHJ, is required for system. Adhesive cited in test literature is required for installation of wall covering on Project.
 - a. Room Corner Tests:
 - 1) ASTM E84, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
 - 2) IBC 803.1.3, 'Room Corner Test for Textile Wall Coverings and Expanded Vinyl Wall Coverings'.
 - 3) IBC 803.1.4, 'Acceptance Criteria for Textile and Expanded Vinyl Wall Coverings Tested to ASTM E84 or UL 723'.
 - 4) NFPA 265, 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls'.
 - 5) UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'.
- B. Qualifications:
 - 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
 - a. Minimum three (3) years experience in wall covering installations.
 - b. Minimum five (5) years satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
 - c. Agree to view 'No-Flame Sisal Wall Covering Recommended Installation Procedures' provided by Owner found on internet in AEC Webpage under Training in Menu tab. Contact Architect for access to video. This requirement may be waived by Owner, if Installer has viewed video before or can document at least two (2) satisfactorily completed projects of comparable size using sisal wall coverings in past three (3) years before bidding.
 - d. Upon request, submit documentation and video verification.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:

1. Deliver materials in sealed containers with Manufacturer's labels intact.

B. Storage And Handling Requirements:

1. Store materials in protected area at temperatures below 90 deg F (32 deg C) and above 50 deg F (10 deg C). Keep from freezing.
2. Keep container tightly closed in well-ventilated area, and store upright when not in use.
3. Shelf life: One (1) year minimum - Unopened containers.

1.6 FIELD CONDITIONS

A. Ambient Conditions:

1. Apply when the temperature is between 50 deg F (10 deg C) minimum and 100 deg F (38 deg C) maximum and relative humidity is less than seventy-five (75) percent.
2. Provide good ventilation.

1.7 WARRANTY

A. Manufacturer Warranty:

1. Provide five (5) year warranty against manufacturing defects.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer Contact List:

1. Design Materials Inc, Kansas City, KS www.dmikc.com.
2. Fibreworks, Louisville, KY www.fibreworks.com.

2.2 DESCRIPTION

A. Colors:

1. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Design Materials: Color 0250.
 - b. Fibreworks: Color 335

2.3 MATERIALS

A. Sisal Wall Covering:

1. 100 percent fire-treated sisal yarn.
2. 1/4 inch (6 mm) pile height, 48 oz/sq yd (1 627 grams/sq meter) minimum. Sisal to be installed full height on walls shall be furnished in 9 or 13 foot (2.75 or 3.96 meters) wide goods.
3. Reversible weave type, without backing.

2.4 ACCESSORIES

A. Wall Covering Adhesive:

1. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
 - a. 257 Sisal Adhesive by Fibreworks.
 - b. Sisal Adhesive No. 1-422 by Design Materials.

B. Seam Cement:

1. Type Two Acceptable Products:

- a. 8415 Glue-Down Carpet Seam Adhesive by Roberts Consolidated Industries, Div QEP, Henderson, NV www.robertsconsolidated.com.
- b. Equal as recommended by Wall Covering Manufacturer with approval of Architect before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 INSTALLERS

- A. Acceptable Installers:
 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.2 EXAMINATION

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

3.3 INSTALLATION

- A. Apply wall covering in accordance with Manufacturer's instructions, available on DVD from Owner through Architect. See Quality Assurance Installer Qualifications as specified in Part 1 of this specification.
- B. Using specified adhesive, glue continuously to surface to be covered with wall covering. Apply adhesive in accordance with Manufacturer's recommendations.
- C. Run 'ribs' in weaving horizontally (panel style) when installing wall covering full height. If sisal installed only as wainscoting, 'ribs' may be installed vertically. Install wall covering so it extends to within **1/8 inch (3 mm)** of floor slab.
- D. Carry sisal around corners approximately **6 inch (152 mm)** making no outside corner cuts.

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 07 9213: 'Elastomeric Joint Sealants' for quality of Elastomeric Joint Sealants.
 - 2. Sections under 09 9000 heading 'Paints and Coatings'.
 - a. Pre-Installation conferences held jointly with Section 09 9001.

1.2 REFERENCES

- A. Definitions:
 - 1. Damage Caused By Others: Damage caused by individuals other than those under direct control of Painting Applicator (MPI(a), PDCA P1.92).
 - 2. Gloss Levels:
 - a. Specified paint gloss level shall be defined as sheen rating of applied paint, in accordance with following terms and values, unless specified otherwise for a specific paint system.

Gloss Level '1'	Traditional matte finish - flat	0 to 5 units at 60 degrees to 10 units maximum at 85 degrees.
Gloss Level '2'	High side sheen flat - 'velvet-like' finish	10 units maximum at 60 degrees and 10 to 35 units at 85 degrees.
Gloss Level '3'	Traditional 'eggshell-like' finish	10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
Gloss Level '4'	'Satin-like' finish	20 to 35 units at 60 degrees and 35 units minimum at 85 degrees.
Gloss Level '5'	Traditional semi-gloss	35 to 70 units at 60 degrees.
Gloss Level '6'	Traditional gloss	70 to 85 units at 60 degrees.
Gloss Level "7"	High gloss	More than 85 units at 60 degrees.

- 3. Properly Painted Surface:
 - a. Surface that is uniform in appearance, color, and sheen and free of foreign material, lumps, skins, runs, sags, holidays, misses, strike-through, and insufficient coverage. Surface free of drips, spatters, spills, and overspray caused by Paint Applicator. Compliance will be determined when viewed without magnification at a distance of 5 feet (1.50 m) minimum under normal lighting conditions and from normal viewing position (MPI(a), PDCA P1.92).
- 4. Latent Damage: Damage or conditions beyond control of Painting Applicator caused by conditions not apparent at time of initial painting or coating work.

- B. Reference Standards:
 - 1. The latest edition of the following reference standard shall govern all painting work:
 - a. MPI(a), 'Architectural Painting Specification Manual' by Master Painters Institute (MPI), as issued by local MPI Accredited Quality Assurance Association having jurisdiction.
 - b. MPI(r), 'Maintenance Repainting Manual' by Master Painters Institute (MPI), as issued by local MPI Accredited Quality Assurance Association having jurisdiction.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Schedule painting pre-installation conference after delivery of paint or coatings and before or at same time as application of field samples.
 - a. Coordinate pre-installation conferences of all related painting and coating Sections under 09 9000 heading 'Paints and Coatings'.
 - b. Schedule conference before preparation of control samples as specified in Sections under 09 9000 heading 'Paints and Coatings'.
 - c. Conference to be held at same time as Section 09 2900 to review gypsum board finish preparation.
 - 2. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review Quality Assurance for Approval requirements.
 - b. Review Quality Assurance Field Sample requirements.
 - c. Review Submittal requirements for compliance for MPI Approved Products.
 - d. Review Design Criteria requirements.
 - e. Review Cleaning requirements.
 - f. Review painting schedule.
 - g. Review safety issues.
 - 3. Review additional agenda items from Sections under 09 9000 heading 'Paints and Coatings'.

1.4 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Include following information for each painting product, arranged in same order as in Project Manual.
 - 1) Manufacturer's cut sheet for each product indicating ingredients and percentages by weight and by volume, environmental restrictions for application, and film thicknesses and spread rates.
 - 2) Provide one (1) copy of 'MPI Approved Products List' showing compliance for each MPI product specified.
 - a) MPI Information is available from MPI Approved Products List using the following link: <http://www.paintinfo.com/mpi/approved/index.shtml>.
 - 3) Confirmation of colors selected and that each area to be painted or coated has color selected for it.
 - 2. Samples: Provide two 4 inch by 6 inch (100 mm by 150 mm) minimum draw-down cards for each paint or coating color selected for this Project.
- B. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Manufacturer's substrate preparation instructions and application instruction for each painting system used on Project.
 - 2. Qualification Statement:
 - a. Applicator:
 - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Manufacturer's documentation:
 - a) Manufacturer's cut sheet for each component of each system.
 - b) Schedule showing rooms and surfaces where each system was used.
- D. Maintenance Materials Submittals:
 - 1. Extra Stock Materials:

- a. Provide painting materials in Manufacturer's original containers and with original labels in each color used. Label each can with color name, mixture instructions, date, and anticipated shelf life.
- b. Provide one (1) quart of each finish coat and one (1) pint of each primer and of each undercoat in each color used.

1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approval:
 1. Conform to work place safety regulations and requirements of those authorities having jurisdiction for storage, mixing, application and disposal of all paint and related hazardous materials.
 2. Paint and painting materials shall be free of lead and mercury, and have VOC levels acceptable to local jurisdiction.
 3. Master Painters Institute (MPI) Standards:
 - a. Products: Comply with MPI standards indicated and listed in 'MPI Approved Products List'.
 - b. Preparation and Workmanship: Comply with requirements in 'MPI Architectural Painting Specification Manual' for products and coatings indicated.
- B. Qualifications:
 1. Applicator: Requirements of Section 01 4301 applies, but not limited to following:
 - a. Minimum five (5) years' experience in painting installations.
 - b. Minimum five (5) satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
 - c. Maintain qualified crew of painters throughout duration of the Work.
 - d. Upon request, submit documentation.

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.
- B. Storage And Handling Requirements:
 1. Store materials in single place.
 2. Keep storage area clean and rectify any damage to area at completion of work of this Section.
 3. Maintain storage area at 55 deg F (13 deg C) minimum.

1.7 FIELD CONDITIONS

- A. Ambient Conditions:
 1. Perform painting operations at temperature and humidity conditions recommended by Manufacturer for each operation and for each product for both interior and exterior work.
 2. Apply painting systems at lighting level of 540 Lux (50 foot candles) minimum on surfaces to be painted.
 - a. Inspection of painting work shall take place under same lighting conditions as application.
 - b. If painting and coating work is applied under temporary lighting, deficiencies discovered upon installation of permanent lighting will be considered latent damage as defined in MPI Manual, PDCA P1-92.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Performance:

1. Design Criteria:

- a. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
- b. All materials, preparation and workmanship shall conform to requirements of 'Architectural Painting Specification Manual' by Master Painters Institute (MPI).
- c. All paint manufacturers and products used shall be as listed under Approved Product List section of MPI Painting Manual.
- d. Provide Premium Grade systems (2 top coats) as defined in MPI Architectural Painting Specification Manual, except as otherwise indicated.
- e. Where specified paint system does not have Premium Grade, provide Budget Grade.
- f. Provide products of same manufacturer for each coat in coating system.
- g. Where required to meet LEED (Leadership in Energy and Environmental Design) program requirements, use only MPI listed materials having an "L" rating designation.
- h. Color Levels:
 - 1) Color Level II:
 - a) Number and placement of interior and exterior paint colors and gloss levels shall be as defined by Color Level II from MPI Manual, PDCA P3-93 as modified in following paragraph.
 - b) No more than one paint color or gloss level will be selected for same substrate within designated interior rooms or exterior areas.
 - 2) Color Level III: (Classrooms with accent color wall(s) as noted on drawings)
 - a) Number and placement of interior and exterior paint colors and gloss levels shall be Color Level III from MPI Manual, PDCA P3-93 as modified in following paragraph.
 - b) Several paint colors or gloss levels will be selected for same substrate within designated interior rooms or exterior areas.

B. Materials:

1. Materials used for any painting system shall be from single manufacturer unless approved otherwise in writing by painting system manufacturers and by Architect. Include manufacturer approvals in Product Data submittal.
2. Linseed oil, shellac, turpentine, and other painting materials shall be pure, be compatible with other coating materials, bear identifying labels on containers, and be of highest quality of an approved manufacturer listed in MPI manuals. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on Project.

PART 3 - EXECUTION

3.1 APPLICATORS

A. Approved Applicators:

1. Meet Quality Assurance Applicator Qualifications as specified in Part 1 of this specification.

3.2 EXAMINATION

A. Verification Of Conditions:

1. Directing applicator to begin painting and coating work will indicate that substrates to receive painting and coating materials have been previously inspected as part of work of other Sections

and are complete and ready for application of painting and coating systems as specified in those Sections.

B. Pre-Installation Testing:

1. Before beginning work of this Section, examine, and test surfaces to be painted or coated for adhesion of painting and coating systems.
2. Report in writing to Architect of conditions that will adversely affect adhesion of painting and coating work.
3. Do not apply painting and coating systems until party responsible for adverse condition has corrected adverse condition.

C. Evaluation And Assessment:

1. Report defects in substrates that become apparent after application of primer or first finish coat to Architect in writing and do not proceed with further work on defective substrate until such defects are corrected by party responsible for defect.

3.3 PREPARATION

A. Protection Of In-Place Conditions:

1. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following:
 - a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.
 - b. Keep cones of ceiling speakers completely free of paint. In all cases where painting of metal speaker grilles is required, paint without grilles mounted to speakers and without grilles on ceiling.
 - c. On existing work where ceiling is to be painted, speakers and grilles are already installed, and ceiling color is not being changed, mask off metal grilles installed on ceiling speakers. If ceiling color is being changed, remove metal grilles and paint, and mask off ceiling speakers.

B. Surface Preparation:

1. Prepare surfaces in accordance with MPI requirements and requirements of Manufacturer for each painting system specified, unless instructed differently in Contract Documents. Bring conflicts to attention of Architect in writing.
2. Fill minor holes and cracks in wood surfaces to receive paint or stain.
3. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.
4. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting. Moisture content of materials to be painted shall be within tolerances acceptable to Paint Manufacturer.
5. Sand woodwork smooth in direction of grain leaving no sanding marks. Clean surfaces before proceeding with stain or first coat application.

3.4 APPLICATION

A. Interface With Other Work:

1. Coordinate with other trades for materials and systems that require painting before installation.
2. Schedule painting and coating work to begin when work upon which painting and coating work is dependent has been completed. Schedule installation of pre-finished and non-painted items, which are to be installed on painted surfaces, after application of final finishes.

B. Paint or finish complete all surfaces to be painted or coated as described in Contract Documents, including but not limited to following items.

1. 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. Unfinished hardwood interiors of wood hung windows.
 3. 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.
 4. Metal reveals at ceiling access doors.
 5. Paint inside of chases in occupied spaces flat black for 18 inches (450 mm) or beyond sightline, whichever is greater.
- C. Apply sealant in gaps 3/16 inch (5 mm) and smaller between two substrates that are both to be painted or coated. Sealants in other gaps furnished and installed under Section 07 9213.
- D. On wood to receive a transparent finish, putty nail holes in wood after application of stain using natural colored type to match wood stain color. Bring putty flush with adjoining surfaces.
- E. In multiple coat paint work, tint each succeeding coat with slightly lighter color, but approximating shade of final coat, so it is possible to check application of specified number of coats. Tint final coat to required color.
- F. Spread materials smoothly and evenly. Apply coats to not less than wet and dry film thicknesses and at spreading rates for specified products as recommended by Manufacturer.
- G. Touch up suction spots after application of first finish coat.
- H. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.
- I. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.
- J. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.
- K. Finished work shall be a 'Properly Painted Surface' as defined in this Section.

3.5 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
1. Correct deficiencies in workmanship as required to leave surfaces in conformance with 'Properly Painted Surface,' as defined in this Section.
 2. Correction of 'Latent Damage' and 'Damage Caused By Others,' as defined in this Section, is not included in work of this Section.

3.6 CLEANING

- A. General:
1. As work proceeds and upon completion of work of any painting Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition.
- B. Waste Management:
1. Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.
 2. Paint, stain and wood preservative finishes and related materials (thinners, solvents, caulking, empty paint cans, cleaning rags, etc.) shall be disposed of subject to regulations of applicable authorities having jurisdiction.

3. Remove debris caused by work of paint Sections from premises and properly dispose.
4. Retain cleaning water and filter out and properly dispose of sediments.

END OF SECTION

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SECTION 09 9111**EXTERIOR PAINTED ALUMINUM****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Preparing and painting new exterior unfinished aluminum surfaces as described in Contract
 - Preparing and painting following existing exterior painted aluminum 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. See Section 01 6200 for definitions of Categories.
- B. Description:
 - 1. New Surfaces: Use MPI(a) EXT 5.4H Latex Finish system.
 - 2. Previously Finished Surfaces: Use MPI(r) REX 5.4G Latex Finish system.
- C. Performance:
 - 1. Design Criteria:
 - a. New Surfaces: MPI Premium Grade finish requirements.
 - b. Deteriorated Existing Surfaces: MPI Premium Grade finish requirements.
 - c. Sound Existing Surfaces: MPI Custom Grade finish requirements.
 - d. Gloss / Sheen Level Required: Gloss Level 6 or 7.
- D. Materials:
 - 1. Primer Coat: MPI Product 95: 'Primer, Quick Dry, for Aluminum'.
 - 2. Finish Coats: MPI Product 119: 'Latex, Exterior, Gloss (MPI Gloss Level 6)'.

PART 3 - EXECUTION

- A. General: See appropriate paragraphs of Section 09 9001.

END OF SECTION

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.
 - 2. Preparing and painting following existing 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'.

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 .
 - 2. Previously Finished Surfaces: Use MPI(r) REX 5.1K Waterborne Light Industrial Coating.
- 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).

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.
- C. Existing Painted Surfaces:
 - 1. Remove deteriorated and chalked existing paint and rust down to sound substrate by scraping or power tools.
 - 2. Clean existing sound painted surfaces as well as scraped and sanded existing painted surfaces as recommended by Paint Manufacturer. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying primer coat.
 - 3. Spot prime bare metal surfaces followed by a prime coat over entire surface to be painted.
 - 4. Lightly sand entire surface.
 - 5. Clean surface as recommended by Paint Manufacturer.
 - 6. Apply specified finish coats.

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.
 - 2. Preparing and painting following existing 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. All Other:
 - a. New Surfaces: Use MPI(a) EXT 5.3H Latex Finish system.
 - b. Previously Finished Surfaces: Use MPI(r) REX 5.3H Latex Finish system.
- C. Performance:
 - 1. Design Criteria:
 - a. New Surfaces: MPI Premium Grade finish requirements.
 - b. Deteriorated Existing Surfaces: MPI Premium Grade finish requirements.
 - c. Sound Existing Surfaces: MPI Custom Grade finish requirements.
 - d. Gloss / Sheen Level Required: Gloss Level 5.
- D. Materials:
 - 1. 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.
- C. Existing Painted Surfaces:
 1. Remove deteriorated and chalked existing paint and rust deposits down to sound substrate by sanding, scraping, or wire brushing.
 2. Clean existing sound painted surfaces as well as scraped and sanded existing painted surfaces as recommended by Paint Manufacturer.
 3. Apply prime coat.
 4. Apply finish coats.
- D. Existing Unpainted Surfaces:
 1. Wirebrush or power wash as necessary to remove 'white rust'.
 2. Apply prime coat.
 3. Apply finish coats.

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 and existing 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 O&M / R&I Projects.
 - 3. Section 09 9413: 'Interior Textured Finishing' for textured finishes.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 2900.
 - a. In addition to agenda items specified in Section 01 3100 and Section 09 2900, review following:
 - 1) Review finish level requirements of gypsum wallboard as specified in Section 09 2900.
 - 2. Participate in pre-installation conference as specified in Section 09 9001.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Category Four Approved Manufacturers and Products. See Section 01 6200 for definitions of Categories.
 - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
 - 1. Rest Rooms and Custodial Rooms:
 - a. New Surfaces: Use MPI(a) INT 9.2F Waterborne Epoxy Finish system.
 - b. Previously Finished Surfaces: Use MPI(r) RIN 9.2E Waterborne Epoxy Finish system.
 - 2. All Other:
 - a. New Surfaces: Use MPI(a) INT 9.2B Latex Finish system.
 - b. Previously Finished Work: Use MPI(r) RIN 9.2B Latex Finish system.
- C. Performance:
 - 1. Design Criteria:

- a. New Surfaces: MPI Premium Grade finish requirements.
 - b. Deteriorated Existing Surfaces: MPI Premium Grade finish requirements.
 - c. Sound Existing Surfaces: MPI Custom Grade requirements.
 - d. Gloss / Sheen Required:
 - 1) Rest Rooms And Custodial Rooms: Gloss Level 6.
 - 2) Chapel Ceiling: Gloss Level 1 or 2.
 - 3) 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)'.
 - 2) Buildings with CMU and Gypsum Board surfaces in same rooms:
 - a) MPI Product 77, 'Epoxy, Gloss'.
 - b. Chapel Ceiling:
 - 1) MPI Product 53, 'Latex, Interior, Flat (MPI Gloss Level 1)'.
 - c. Remaining Painted Surfaces:
 - 1) MPI Product 141, 'Latex, Interior, High Performance Architectural, Semi-Gloss (MPI Gloss Level 5)'.

PART 3 - EXECUTION

3.1 APPLICATION

- A. General: See appropriate paragraphs of Section 09 9001.
- B. New Surfaces:
 1. Primer: Apply primer to be covered with other paint coats with roller only, or with spray gun and back-rolled.
- C. Existing Painted Surfaces:
 1. Remove deteriorated existing paint down to sound substrate by scraping or sanding. Feather edges of existing paint by sanding to be smooth with adjacent surfaces.
 2. Clean surface with mild soap and water, or with tri-sodium phosphate (TSP). Wash surfaces that have been defaced with marking pens, crayons, lipstick, etc, with solvent recommended by Paint Manufacturer. Spot prime such surfaces.
 3. Spackle and tape cracks. Sand to smooth finish and spot prime.
 4. Sand or chemically etch existing painted surface as required to prepare surface to accept new paint.
 5. Re-clean surface.
 6. Apply primer coat.
 7. Apply finish coats.

END OF SECTION

SECTION 09 9124**INTERIOR PAINTED METAL****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Preparing and painting new and existing interior metal surfaces as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 05 5871: 'Metal Brackets'.
 - 2. Section 09 9001: 'Common Painting And Coating Requirements':
 - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
 - b. 'Attachment: Paint Color Schedule' for O&M / R&I Projects.
 - 3. Section 23 0553: 'I. D. For HVAC Piping And Equipment' for field painting requirements of HVAC piping and equipment.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 9001.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories.
 - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
 - 1. Ferrous Metal:
 - a. New Surfaces: Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system.
 - b. Previously Finished Surfaces: Use MPI(r) RIN 5.1B Waterborne Light Industrial Finish system.
 - 2. Galvanized Metal:
 - a. New Surfaces: Use MPI(a) INT 5.3J Latex Finish system
 - b. Previously Finished Surfaces: Use MPI(r) RIN 5.3AH Latex Finish system.
 - 3. Aluminum:
 - a. New Surfaces: Use MPI(a) INT 5.4E Waterborne Light Industrial Finish system.
 - b. Previously Finished Surfaces: Use MPI(r) REX 5.4E Light Industrial Finish system.
- C. Performance:
 - 1. Design Requirements:
 - a. New Surfaces: MPI Premium Grade finish requirements.
 - b. Deteriorated Existing Surfaces: MPI Premium Grade finish requirements.
 - c. Sound Existing Surfaces: MPI Custom Grade finish requirements.
 - d. Gloss / Sheen Level Required: Gloss Level 5.

- D. Materials:
 - 1. Primers:
 - a. Ferrous Metal: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
 - b. Galvanized Metal: MPI Product 134: 'Primer, Galvanized, Water Based'.
 - c. Aluminum: MPI Product 95: 'Primer, Quick Dry, for Aluminum'.
 - 2. Finish Coats: MPI Product 153: 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.

PART 3 - EXECUTION

3.1 APPLICATION

- A. General:
 - 1. See appropriate paragraphs of Section 09 9001.
 - 2. Systems specified are in addition to prime coats furnished under other Sections.
- B. New Surfaces: Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.
- C. Existing Painted Surfaces:
 - 1. Remove deteriorated existing paint down to sound substrate by scraping and sanding. Feather edges of existing paint by sanding to be smooth with adjacent surfaces. Spot prime bare metal surfaces immediately.
 - 2. Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.
 - 3. Clean existing sound painted surfaces as well as scraped and sanded existing painted surfaces as recommended by Paint Manufacturer.
 - 4. Apply prime coat over entire surface to be painted.
 - 5. Lightly sand entire surface.
 - 6. Clean surface as recommended by Paint Manufacturer.
 - 7. Apply finish coats.

END OF SECTION

SECTION 09 9125**INTERIOR PAINTED WOOD****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Preparing and painting new and existing woodwork and wood floors 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 O&M / R&I Projects.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 9001.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
 - 1. Systems:
 - a. Floors:
 - 1) New Surfaces: Use MPI(a) INT 6.5H Waterborne Epoxy Finish system.
 - 2) Previously Finished Surfaces: Use MPI(r) RIN 6.5K Latex Finish system.
 - b. All Other:
 - 1) New Surfaces: Use MPI(a) INT 6.3T or U Latex Finish system.
 - 2) Previously Finished Surfaces: MPI(r) Rin 6.3U Latex Finish system.
- C. Performance:
 - 1. Design Criteria:
 - a. New Surfaces: MPI Premium Grade finish requirements.
 - b. Deteriorated Existing Surfaces: MPI Premium Grade finish requirements.
 - c. Sound Existing Surfaces: MPI Custom Grade finish requirements.
 - d. Gloss / Sheen Level Required: Gloss Level 5.
- D. Materials:
 - 1. Wood Floors:
 - a. Low to medium traffic: MPI Product 60, 'Floor Paint, Latex, Low Gloss'.
 - 2. Woodwork:

- a. Primer Coat: MPI Product 39, 'Primer, Latex, for Interior Wood' or MPI Product 45, 'Primer Sealer, Alkyd, Interior'.
- b. Finish Coats: MPI Product 153, 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.

PART 3 - EXECUTION

3.1 APPLICATION

- A. General: See appropriate paragraphs of Section 09 9001.
- B. Interface With Other Work:
 1. Properly clean and paint light cove interiors before installation of light fixtures.
 2. Where back-priming is required, apply one (1) coat of primer.
- C. New Surfaces:
 1. Spot prime nail holes, cracks, and blemishes before and after puttying.
 2. Apply stain blocker or other product recommended by Paint Manufacturer to knots before applying primer coat.
- D. Existing Painted Surfaces:
 1. Remove deteriorated existing paint down to sound substrate by scraping and sanding. Feather edges of existing paint by sanding to be smooth with adjacent surfaces. Spot prime bare wood areas on woodwork.
 2. Wash surfaces that have been defaced with marking pens, crayons, lipstick, etc, with solvent recommended by Paint Manufacturer. Spot prime such surfaces.
 3. Apply finish coats.

END OF SECTION

SECTION 09 9324

INTERIOR CLEAR-FINISHED HARDWOOD

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Preparing and finishing of new interior clear finished hardwood as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 09 9001: 'Common Painting And Coating Requirements':
 - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
 - b. 'Attachment': Paint Color Schedule' for O&M / R&I Projects.
 - 2. Section 09 0193: Refinishing existing interior clear finished hardwood.

1.2 REFERENCES

- A. Reference Standards:
 - 1. Kitchen Cabinet Manufacturers Association / American National Standards Institute:
 - a. ANSI/KCMA A161.1-2000 (R2005) 23-Jan-2001 'Recommended Performance and Construction Standards for Kitchen and Vanity Cabinets.'

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 9001.
 - 2. In addition to agenda items specified in Section 01 3100 and Section 09 9001, review following:
 - a. Review control sample(s).

1.4 SUBMITTALS

- A. Action Submittals:
 - 1. Samples:
 - a. Interior Hardwood for Transparent Finish:
 - 1) Requirements for samples are specified in Related Requirement Sections listed above.
 - b. Design Criteria:
 - 1) Sample will be used as performance standard for evaluating finish provided.
- B. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. Before beginning finish work, submit Finish Manufacturer's literature or certification that finish material meets requirements of ANSI / KCMA A161.1.

PART 2 - PRODUCTS

2.1 SYSTEM

- A. Materials:

1. Design Criteria:
 - a. See appropriate paragraphs of Section 09 9001.
2. Stain: MPI 90, 'Stain, Semi-Transparent, for Interior Wood'.
3. Clear Finish Coats:
 - a. Field Finished:
 - 1) Chemcraft International Inc:
 - a) First, Second, And Third Coats: 20 Sheen Opticlear Pre-Catalyzed Lacquer.
 - 2) ICI Dulux / Trinity:
 - a) First Coat: ICE Vinyl Sanding Sealer.
 - b) Second And Third Coats: ICI Pre-Catalyzed Lacquer.
 - 3) Lilly / Valspar:
 - a) First, Second, And Third Coats: 20 Sheen Pre-Catalyzed Lacquer 587E208.
 - 4) Sherwin-Williams:
 - a) First Coat: T67F3 Vinyl Sealer.
 - b) Second And Third Coats: T77F38 Sherwood Pre-Catalyzed Lacquer DRE.
 - b. Mill Finished: Architectural Woodwork finished in a mill may use one (1) coat of Vinyl Sealer and two (2) coats of Conversion Varnish or three (3) coats of Conversion Varnish from one (1) of the approved Finish Manufacturers, as recommended by Finish Manufacturer.
 - c. Products meeting testing requirements for finishes of ANSI / KCMA A161.1 may be used upon approval of submission by Architect before use. See Section 01 6200.
4. Color:
 - a. Design Criteria:
 - 1) Finish to match Owner selected sample.
 - 2) Performance standard: Owner provided sample.
 - a) Contractor to use existing wood samples from project site to match.

PART 3 - EXECUTION

3.1 APPLICATION

- A. General:
 1. See appropriate paragraphs of Section 09 9001.
 2. Sand entire exposed surface of item to be finished lightly with 120 to 150 non-stearated sandpaper and clean before applying dye or stain.
 3. Apply stain in accordance with Manufacturer's recommendations and as necessary to attain correct color.
 4. Scuff sand with 220 non-stearated sandpaper between application of application stain and first finish coat.
 5. If wood is finished before installation, finish cut ends and other unfinished, exposed surfaces same as previously finished surfaces after installation of wood.
- B. Where back-priming is required, apply one coat of finish material.
- C. Architectural Woodwork Door Surfaces (cabinetry doors only):
 1. Finish tops, bottoms, and edges before faces.
 2. Finish architectural woodwork doors with no hardware applied to doors.

END OF SECTION

SECTION 09 9413**INTERIOR TEXTURED FINISHING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and apply texturing on walls and ceilings as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 09 2900: 'Gypsum Board' for priming.
 - 2. Section 09 9001: 'Common Painting And Coating Requirements' for:
 - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
 - 3. Section 09 9123: 'Interior Painted Gypsum Board, Plaster' for finish painting.

1.2 REFERENCES

- A. Definitions:
 - 1. Drywall Texture: Compound rolled, sprayed, or troweled onto sheetrock after taping and floating of joints is complete. Uses same material as joint compound, but thinned down with water and applied to wall surface:
 - a. Light Orange Peel: Sprayed texture leaves light splatter on walls. Resembles peel of orange. If done with fine spray, can be one of the lightest, least noticeable of the texture styles.
 - b. Smooth - Smooth application of texture over sheetrock wall that feathers out sheetrock joints, and creates even, non-textured wall.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 09 9001.
 - 2. In addition to agenda items specified in Section 01 3100 and Section 09 9001, review following:
 - a. Review control samples.

1.4 SUBMITTALS

- A. Action Submittals:
 - 1. Samples:
 - a. Light Orange Peel Texture:
 - 1) Provide minimum of three (3) 24 inch (600 mm) square control samples on primed gypsum wallboard of 'light orange peel' texture to show possible variations.

1.5 QUALITY ASSURANCE

- A. Field Samples:
 - 1. Before performing work of this Section, prepare control samples.
 - 2. Architect will inspect control sample at pre-installation conference following preparation of control sample. When sample is approved, work of this Section may proceed. Approved samples will be kept at site at all times work of this section is being performed.

PART 2 - PRODUCTS

2.1 SYSTEM

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. National Gypsum, Charlotte, NC www.nationalgypsum.com.
 - 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: (Field Verify to match existing textured finishes where applicable)
 - 1. Walls:
 - a. Light Orange Peel Texture:
 - 1) All areas except those listed in following paragraph.
 - b. Smooth:
 - 1) Walls designated to receive mural artwork. These walls will be identified by Owner prior to start of texturing work.
- B. Finishing:
 - 1. Light Orange Peel Texture:
 - a. After gypsum board is taped and sanded, apply texture. Closely match samples accepted by Architect.
 - 1) After wall has been textured, apply priming and finish paint as specified in Section 09 9123.
 - 2. Smooth:
 - a. No applied texture is required. Apply priming and paint as specified in Section 09 9123.

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 2726 WIRING DEVICES

26 5000 LIGHTING

- 26 5100 INTERIOR LIGHTING
- 26 5200 EMERGENCY LIGHTING
- 26 5600 EXTERIOR 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.
- B. Products Furnished But Not Installed Under This Section:
 - 1. Anchor bolts and templates for exterior lighting equipment bases.

1.2 REFERENCES

- A. Reference Standards:
 - 1. National Fire Protection Association / American National Standards Institute:
 - a. NFPA 70, National Electric Code (NEC).
 - 2. National Electrical Manufacturing Association Standards (NEMA):
 - a. NEMA 250, 'Enclosure for Electrical Equipment (1000 Volts Maximum)'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate with Owner for equipment and materials to be removed by Owner.
 - 2. Coordinate with other trades for disconnect of power to equipment.
- B. Sequencing:
 - 1. Include detailed sequence of individual electrical demolition operations on Construction Schedule specified in Section 01 3200.

1.4 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Provide following information for each item of equipment:
 - 1) Catalog Sheets.
 - 2) Assembly details or dimension drawings.
 - 3) Installation instructions.
 - 4) Manufacturer's name and catalog number.
 - 5) Name of local supplier.
 - b. Furnish such information for following equipment:
 - 1) Section 26 2726: 'Wiring Devices'.
 - 2) Section 26 5100: 'Interior Lighting Fixtures'.
 - 3) Section 26 5200: 'Emergency Lighting' for battery units.
 - 4) Section 26 5600: 'Exterior Lighting' for fixtures.
 - c. Do not purchase equipment before approval of product data.
- 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 – chapel north rear exit, north corridor east end, main west foyer, etc.).

1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 1. NEC and local ordinances and regulations shall govern unless more stringent requirements are specified.
 2. Material and equipment provided shall meet standards of NEMA or UL and bear their label wherever standards have been established and label service is available.
- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
 1. Electrical Subcontractor:
 - a. Company specializing in performing work of this section.
 - 1) Minimum five (5) years experience in electrical installations.
 - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
 - b. Upon request, submit documentation.
 2. Installer:
 - a. Licensed for area of Project.
 - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
 - c. Upon request, submit documentation.

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. Acceptable Installers:
 - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.2 EXAMINATION

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

3.3 PREPARATION

- A. Disconnect equipment that is to be removed or relocated. Carefully remove, disassemble, or dismantle as required, and store in approved location on site, existing items to be reused in completed work.
- B. Where affected by demolition or new construction, relocate, extend, or repair raceways, conductors, outlets, and apparatus to allow continued use of electrical system. Use methods and materials as specified for new construction.
- C. Perform drilling, cutting, block-offs, and demolition work required for removal of necessary portions of electrical system. Do not cut joists, beams, girders, trusses, or columns without prior written permission from Architect.
- D. Remove concealed wiring abandoned due to demolition or new construction. Remove circuits, conduits, and conductors that are not to be re-used back to next active fixture, device, or junction box.
- E. Patch, repair, and finish surfaces affected by electrical demolition work, unless work is specifically specified to be performed under other Sections of the specifications.

3.4 INSTALLATION

- A. General:
 - 1. Locations of electrical equipment shown on Drawings are approximate only. Field verify actual locations for proper installation.
 - 2. Coordinate electrical equipment locations and conduit runs with those providing equipment to be served before installation or rough in.
 - a. Notify Architect of conflicts before beginning work.
 - b. Coordinate locations of power and lighting outlets in mechanical rooms and other areas with mechanical equipment, piping, ductwork, cabinets, etc, so they will be readily accessible and functional.
 - 3. Work related to other trades which is required under this Division, such as cutting and patching, trenching, and backfilling, shall be performed according to standards specified in applicable Sections.

3.5 FIELD QUALITY CONTROL

A. Field Tests:

1. Test systems and demonstrate equipment as working and operating properly. Notify Architect before test. Rectify defects at no additional cost to Owner.
2. Measure current for each phase of each motor under actual final load operation, i.e. after air balance is completed for fan units, etc. Record this information along with full-load nameplate current rating and size of thermal overload unit installed for each motor.

3.6 CLEANING

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

3.7 CLOSEOUT ACTIVITIES

A. Training:

1. Provide competent instructor for three (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'.
 - 2. Section 28: Provisions for Fire Alarm System modifications and Door Alarm System

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).
 - 1) Article 334, "Nonmetallic-Sheathed Cable, Types NM, NMC And NMS'.

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 (24 deg C)).
 - b. Standard Conductor Size No. 8 And Larger: 600V Type THW, THWN, or XHHW (75 deg F (24 deg C)).
 - 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. 480Y / 277 Volt System:
 - 1) Brown: Phase A.
 - 2) Orange: Phase B.
 - 3) Yellow: Phase C.
 - 4) Gray: Neutral.
 - 5) Green: Ground.

- c. Conductors size No. 10 and smaller shall be colored full length. Tagging or other methods for coding of conductors size No. 10 and smaller not allowed.
 - d. For feeder conductors larger than No. 10 at pull boxes, gutters, and panels, use painted or taped band or color tag color-coded as specified above.
- B. Line Voltage Cables:
1. Metal Clad Cable (MC) may be used as restricted below:
 - a. Copper conductors.
 - b. Sizes #12 through #8.
 - c. Use only in indoor dry locations where:
 - 1) Not subject to damage.
 - 2) Not in contact with earth.
 - 3) Not in concrete.
- C. Standard Connectors:
1. Conductors No. 8 And Smaller: Steel spring wire connectors.
 2. Conductors Larger Than No. 8: Pressure type terminal lugs.
 3. Connections Outside Building: Watertight steel spring wire connections with waterproof, non-hardening sealant.

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.
- C. Line Voltage Cables:
1. Route circuits at own discretion, however, circuiting and numbering shall be as shown in Panel Schedules.
 2. Support cables using approved staples, cable ties, straps, hangers, or similar fittings, spaced as required.
 3. Where installing in framing, do not bore holes in joists or beams outside center 1/3 of member depth or within **24 inches (600 mm)** of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width. Holes shall be one inch diameter maximum.

4. Conceal cables within ceilings and walls of finished areas. Cables may be exposed in unfinished areas but not run on floors of mechanical equipment spaces or in such a way that they obstruct access to, operation of, or servicing of equipment.
5. Install exposed cables parallel to or at right angles to building structure lines.
6. Keep cables 6 inches (150 mm) minimum from hot water pipes.
7. Do not support cables from mechanical ducts or duct supports without Architect's written approval.
8. Prohibited procedures:
 - a. Boring holes for installation of cables in vertical truss members.
 - b. Notching of structural members for installation of cables.

END OF SECTION

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SECTION 26 0523**CONTROL-VOLTAGE ELECTRICAL CABLES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install control-voltage electrical cables as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements'.
 - 2. Section 28 3101: 'Fire Detection And Alarm System' for cables.
 - 3. Division 28: Door Alarm System

1.2 REFERENCES

- A. Definitions:
 - 1. Control Voltage: 70 Volts and under.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Category Four Approved 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. Conceal cables within ceilings and walls of finished areas. Cables may be exposed in unfinished areas but not run on floors of mechanical equipment spaces or in such a way that they obstruct access to, operation of, or servicing of equipment unless otherwise indicated in Contract Drawings.
 3. Run exposed cables parallel to or at right angles to building structure lines.
 4. Keep cables **6 inch (150 mm)** minimum from hot water pipes.
 5. Support cables using approved staples, cable ties, straps, hangers, or similar fittings spaced every **3 feet (900 mm)**.
 6. Where installing in framing, do not bore holes in joists or beams outside center 1/3 of member depth or within **24 inches (600 mm)** of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width. Holes shall be **1/2 inch (13 mm)** diameter maximum.
 7. Bundle only cables of same systems together.
 8. Do not run cables within **10 inches (255 mm)** of line voltage conductors/raceways.
 9. Extend cables **18 inches (450 mm)** 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 (255 mm)** of line voltage conductors / raceways. Also, maintain **10 inches (255 mm)** 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).

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. Rack and Cabinet Grounding/Earthing:
 - 1) Equipment and racks shall be bonded in accordance with methods prescribed in TIA-942.
 - 2) All grounding backbone should be #6 AWG copper cable.
 - 3) In telecommunications spaces with small number of racks or cabinets, rack/cabinet grounding/earthing jumper cable directly to telecommunications ground bus is permitted. Large spaces shall utilize mesh Common Bonding network, or overhead grounding backbone.
 - 4) Equipment racks, housings, messenger cables, and raceways:
 - a) Connect cabinets, racks, frames and terminal boards to single-point ground which is connected to building ground system proper sized, bonded and tested green insulated copper grounding conductor.
- C. Materials:
1. Grounding And Bonding Jumper Conductors: Bare copper or with green insulation.
 2. Make grounding conductor connections to ground rods and foundation ground loop using approved bolted clamps listed for such use.
 3. Service Grounding Connections And Cable Splices: Make by exothermic process.
 4. Telecommunications ground bus bar (TGB): copper.
 - a. Grounding bus bar:
 - 1) Technology Room shall be provided with telecommunications ground bus bar (TGB).
 - 2) Ground loop current potential is minimized between telecommunications equipment and electrical system to which it is attached.
 - b. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in Technology Room shall be grounded to respective TGB using minimum #6 AWG stranded copper bonding conductor and compression connectors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work: Coordinate with Section 03 3111 in installing grounding conductor and placing concrete. Do not allow placement of concrete before Architect's inspection of grounding conductor installation.

- B. Grounding conductors and bonding jumper conductors shall be continuous from terminal to terminal without splice. Provide grounding for following.
 - 1. Electrical service, its equipment and enclosures.
 - 2. Conduits and other conductor enclosures.
 - 3. Neutral or identified conductor of interior wiring system.
 - 4. Main panelboard, power and lighting panelboards.
 - 5. Non-current-carrying metal parts of fixed equipment such as motors, starter and controller cabinets, instrument cases, and lighting fixtures.
- C. Provide concrete-encased electrode system by embedding **20 feet (6.10 m)** minimum of No. 2/0 bare copper conductor in concrete footing that is in direct contact with the earth, **2 inches (50 mm)** minimum below concrete surface. Extend No. 2/0 copper conductor to main panel as shown on Drawings.
- D. Ground identified common conductor of electrical system at secondary side of main transformer supplying building. Ground identified grounded (neutral) conductor of electrical system on supply side of main service disconnect.
- E. Pull grounding conductors in non-metallic raceways, in flexible steel conduit exceeding **72 inches (1 800 mm)** in length, and in flexible conduit connecting to mechanical equipment.
- F. Provide grounding bushings on all feeder conduit entrances into panelboards and equipment enclosures.
- G. Bond conduit grounding bushings to enclosures with minimum #10 AWG conductor.
- H. 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.
- I. Run separate insulated grounding cable from each equipment cabinet to electrical panel. Do not use intermediate connections or splices. Affix directly to cabinet.
- J. On motors, connect ground conductors to conduit with approved grounding bushing and to metal frame with bolted solderless lug.
- K. Ground cabinet of transformers to conduit and ground wires, if installed. Bond transformer secondary neutral conductor to cabinet.
- L. TGB shall be **1/4 inch (6.4 mm)** thick x **2 inches (50 mm)** high x **12 inches (305 mm)** long installed with insulated standoffs at location directed.
- M. Ground rack to TGB using #6 copper conductor and compression connector.

END OF SECTION

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SECTION 26 0533**RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Quality of material and installation procedures for raceway, boxes, and fittings used on Project but furnished under other Divisions.
 - 2. Furnish and install raceway, conduit, and boxes used on Project not specified to be installed under other Divisions.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements' for general electrical requirements'.
 - 2. Division 28: for fire alarm and door alarm systems.

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).

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 or Hubbell Canada Inc, Pickering, ON (905) 839-4332.
 - c. Square D, Palatine, IL www.squared.com.
 - d. Thomas & Betts, Memphis, TN www.tnb.com or Thomas & Betts Ltd, Iberville, PQ (450) 347-5318.
 - e. Walker Systems Inc, Williamstown, WV (800) 240-2601 or Walker Systems Inc / Wiremold Canada Inc, Fergus, ON (519) 843-4332.
 - f. Wiremold Co, West Hartford, CT www.wiremold.com.
- B. Materials:
 - 1. Raceway And Conduit:
 - a. Sizes:
 - 1) **3/4 inch (19 mm)** for exterior use, unless indicated otherwise.
 - 2) **1/2 inch (13 mm)** for interior use, unless indicated otherwise.
 - b. Types: Usage of each type is restricted as specified below by product.
 - 1) Galvanized rigid steel or galvanized intermediate metal conduit (IMC) is allowed for use in all areas. Where in contact with earth or concrete, wrap buried galvanized rigid steel and galvanized IMC conduit and fittings completely with vinyl tape.
 - 2) Galvanized Electrical Metallic Tubing (EMT) and Flexible Steel Conduit:
 - a) Allowed for use only in indoor dry locations where it is:
 - (1) Not subject to damage.
 - (2) Not in contact with earth.

- (3) Not in concrete.
 - b) For metal conduit systems, flexible steel conduit is required for final connections to indoor mechanical equipment.
 - 3) Schedule 40 Polyvinyl Chloride (PVC) Conduit:
 - a) Allowed for use only underground or below concrete with galvanized rigid steel or IMC elbows and risers.
 - 4) Listed, Liquid-Tight Flexible Metal Conduit:
 - a) Use in outdoor final connections to mechanical equipment, length not to exceed **36 inches (900 mm)**.
 - 5) Pre-wired **3/8 Inch (9.5 mm)** Flexible Fixture Whips: Allowed only for connection to recessed lighting fixtures, lengths not to exceed **72 inches (1 800 mm)**.
 - c. Prohibited Raceway Materials:
 - 1) Aluminum conduit.
 - 2) Armored cable type AC (BX) cable.
2. Raceway And Conduit Fittings:
 - a. Rigid Steel Conduit And IMC: Threaded and designed for conduit use.
 - b. EMT:
 - 1) Compression type.
 - 2) Steel set screw housing type.
 - c. PVC Conduit:
 - 1) PVC type. Use PVC adapters at all boxes.
 - 2) PVC components, (conduit, fittings, cement) shall be from same Manufacturer.
 - d. Flexible Steel Conduit: Screw-in type.
 - e. Liquid-tight Flexible Metal Conduit: Sealite type.
 - f. Expansion fittings shall be equal to OZ Type AX sized to raceway and including bonding jumper.
 - g. Prohibited Fitting Materials:
 - 1) Crimp-on, tap-on, indenter type fittings.
 - 2) Cast set-screw fittings for EMT.
 - 3) Spray (aerosol) PVC cement.
3. Outlet Boxes:
 - a. Galvanized steel of proper size and shape are acceptable for all systems. Where metal boxes are used, provide following:
 - 1) Provide metal supports and other accessories for installation of each box.
 - 2) Equip ceiling and bracket fixture boxes with fixture studs where required.
 - 3) Equip outlets in plastered, paneled, and furred finishes with plaster rings and extensions to bring box flush with finish surface.
 - b. Non-metallic boxes may be used only for control voltage wiring systems.
 - c. Telephone / data outlet boxes shall be single device outlet boxes.
 - d. HVAC Instrumentation And Control:
 - 1) Junction boxes in mechanical equipment areas shall be **4 inches (100 mm)** square.
 - 2) Boxes for remote temperature sensor devices shall be recessed single device.
 - 3) Boxes for thermostats shall be **4 inches (100 mm)** square with raised single device cover.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
 - 1. Confirm dimensions, ratings, and specifications of materials to be installed and coordinate these with site dimensions and with other Sections.

3.2 INSTALLATION

- A. Interface With Other Work:

1. Coordinate with Divisions 22 and 23 for installation of raceway for control of plumbing and HVAC equipment.
 2. Before rough-in, verify locations of boxes with work of other trades to insure that they are properly located for purpose intended.
 3. Install pull wires in raceways installed under this Section where conductors or cables are to be installed under other Divisions.
- B. General:
1. Sound and video system electrical components furnished and installed under this Section include following items:
 - a. Fittings.
- C. Conduit And Raceway:
1. Conceal raceways within ceilings, walls, and floors, except at Contractor's option, conduit may be exposed on walls or ceilings of mechanical equipment areas and above acoustical panel suspension ceiling systems. Install exposed raceway runs parallel to or at right angles to building structure lines.
 2. Seal all raceways penetrating fire rated walls, ceilings and barriers. See Section 07 8400.
 3. Keep raceway runs **6 inches (150 mm)** 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 (32 mm)** in diameter and larger, and on all raceways where cables emerge. Install expansion fittings where raceways cross building expansion joints.
 7. Bend PVC conduit by hot box bender and, for PVC **2 inches (50 mm)** in diameter and larger, expanding plugs. Apply PVC adhesive only by brush.
 8. Installation In Framing:
 - a. Do not bore holes in joists or beams outside center **1/3** of member depth or within **24 inches (600 mm)** of bearing points. Do not bore holes in vertical framing members outside center **1/3** of member width.
 - b. Holes shall be **one inch (25 mm)** diameter maximum.
 9. Underground Raceway And Conduit:
 - a. Bury underground raceway installed outside building **24 inches (600 mm)** deep minimum.
 - b. Bury underground conduit in planting areas **24 inches (600 mm)** deep minimum. It is permissible to install conduit **6 inch (150 mm)** below concrete sidewalks, however, conduit must be buried **24 inches (600 mm)** deep at point of exit from planting areas.
 10. 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.
 11. Prohibited Procedures:
 - a. Use of wooden plugs inserted in concrete or masonry units for mounting raceway, supports, boxes, cabinets, or other equipment.
 - b. Installation of raceway that has been crushed or deformed.
 - c. Use of torches for bending PVC.
 - d. Spray applied PVC cement.
 - e. Boring holes in truss members.
 - f. Notching of structural members.
 - g. Supporting raceway from ceiling system support wires.
 - h. Nail drive straps or tie wire for supporting raceway.

- D. Boxes:
1. Boxes shall be accessible and installed with approved cover.
 2. Do not locate device boxes that are on opposite sides of framed walls in the same stud space. In other wall construction, do not install boxes back to back.
 3. Locate boxes so pipes, ducts, or other items do not obstruct outlets.
 4. Install outlets flush with finished surface and level and plumb.
 5. Support switch boxes larger than two-gang with side brackets and steel bar hangers in framed walls.
 6. At time of substantial completion, install blank plates on uncovered outlet boxes that are for future use.
 7. Install air-vapor barrier boxes.
 - a. Follow Manufacturer's installation instructions.
 8. 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 (150 mm) 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.
- E. Support factory-fabricated speaker enclosures from structure or ceiling suspension system.

END OF SECTION

SECTION 26 0613**ELECTRICAL EQUIPMENT MOUNTING HEIGHT SCHEDULE****PART 1 - GENERAL: Not Used****PART 2 - PRODUCTS: Not Used****PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Unless otherwise indicated, mount center of outlets or boxes at following heights above finish floor. Refer special conditions to Architect before rough-in and locate outlet under his direction.
- B. Mounting Heights:
1. Electrical:
 - a. Receptacles: 18 inches
 - b. Wall Switches: 42 inches
 - c. Wall-Mounted Exit Lights: 90 inches
 - d. Wall-Mounted Exterior Lights: 90 inches
 2. Fire Alarm:
 - a. Horn / Strobe match existing height
 3. Door Alarm:
 - a. Magnetic Door Holders 78 Inches
 - b. Audible Notification Devices 78 inches
 - c. Control Panel 48 inches
 - d. Key Pan and Key Switch 48 inches

END OF SECTION

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SECTION 26 2726**WIRING DEVICES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install wiring devices complete with plates as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements'.

PART 2 - PRODUCTS**2.1 COMPONENTS**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Cooper Wiring Devices, Peachtree City, GA www.cooperwiringdevices.com.
 - 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 or Hubbell Canada Inc, Pickering, ON (800) 263-4622 or (905) 839-4332.
 - e. Hunt Control Systems Inc, Fort Collins, CO www.huntdimming.com.
 - f. Intermatic Inc, Spring Grove, IL www.intermatic.com.
 - g. IR-TEC America, Inc., Brea, CA www.irtec.com/en-ira/.
 - h. Leviton Manufacturing Co, Little Neck, NY www.leviton.com or Leviton Manufacturing of Canada Ltd, Pointe-Claire, QB (800) 461-2002 or (514) 954-1840.
 - i. Legrand, West Hartford, CT www.legrand.us.com or Vaughan, ON www.legrand.ca.com.
 - j. Lutron Electronics Co Inc, Coopersburg, PA www.lutron.com.
 - k. Ortronics, New London, CT www.ortronics.com.
 - l. Paragon Electric Co Inc, Carol Stream, IL www.icca.invensys.com/paragon or Paragon Electric, Mississauga, ON (800) 951-5526 or (905) 890-5956.
 - m. Pass & Seymour, Syracuse, NY www.passandseymour.com or Pass & Seymour Canada Inc, Concord, ON (905) 738-9195.
 - n. Philips Lighting Co, Somerset, NJ www.lighting.philips.com/nam or Philips Lighting Canada, Scarborough, ON (416) 292-3000.
 - o. Red Dot div of Thomas & Betts, Memphis, TN www.tnbcom.
 - p. Schneider Electric North America, Palatine, IL www.schneider-electric.com (847) 397-2600.
 - q. Sensorswitch, Wallingford, CT www.sensorswitch.com.
 - r. Siemon Company, Watertown, CT www.siemon.com.
 - s. Square D Co, Palatine, IL www.squared.com.
 - t. Suttle, Hector, MN www.suttleonline.com.
 - u. Tork Inc, Mount Vernon, NY www.tork.com.
 - v. 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.
 - c. Devices are listed as white. Use white devices on light colored walls, brown on dark colored walls, and black on black walls.
- B. Switches:
 - 1. Standard Style:

- a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) 20 AMP, single pole:
 - a) Cooper: 2221V.
 - b) Hubbell: HBL1221-I.
 - c) Pass & Seymour: 20AC1-I.
 - d) Leviton: 1221-2I.
 - 2) Three Way:
 - a) Cooper: 2223V.
 - b) Hubbell: HBL1223-I.
 - c) Pass & Seymour: 20AC3-I.
 - d) Leviton: 1223-2I.
- C. Receptacles:
 - 1. Rectangular Face Designer Style:
 - a. 15 AMP, specification grade, back and side wired, self grounding.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Cooper: 6262W.
 - 2) Hubbell: HBL2152WA.
 - 3) Leviton: 16252-W.
 - 4) Pass & Seymour: 26252-W.
 - 2. Ground Fault Circuit Interrupter (GFCI):
 - a. 15 AMP, specification grade.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Cooper: GF15W.
 - 2) Hubbell: GF5252WA.
 - 3) Leviton: 8599-W.
 - 4) Pass & Seymour: 1594-W.
- D. Plates:
 - 1. Standard Cover Plates:
 - a. Office / Occupied Areas:
 - 1) Nylon or high impact resistant thermoplastic.
 - 2) Color shall match wiring device.
 - b. All Other: Steel.
 - c. Ganged switches shall have gang plates.
 - d. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - 1) Cooper.
 - 2) Hubbell.
 - 3) Leviton.
 - 4) Pass & Seymour.
- E. Occupancy Sensors:
 - 1. Ceiling, ultrasonic type.
 - a. Complete with sensor and combined relay / control transformer.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Cooper Controls:
 - a) Sensor: OAC-U-0501-R.
 - b) Relay / Transformer: SP20-MV.
 - 2) IR-TEC America:
 - a) Sensor: OS-361DT.
 - b) Relay / Transformer: PPU-300.
 - 3) Leviton:
 - a) Sensor: OSC05-RUW.
 - b) Relay / Transformer: OPP20-D2.
 - 4) Sensorswitch:
 - a) Sensor: CMPDT9.
 - b) Relay / Transformer: MP-20-SP0DM.
 - 5) Watt Stopper:
 - a) Sensor: W-500A.
 - b) Relay / Transformer: BZ-150.

- c. Provide manual ON and OFF momentary override switches. Refer to Contract Drawings for number of switches.

PART 3 - EXECUTION

3.1 INSTALLATION

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

END OF SECTION

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SECTION 26 5100**INTERIOR LIGHTING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install lighting system as described in Contract Documents, complete with lamps.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements'.
 - 2. Section 09 5116: 'Acoustical Tile Ceilings'.

1.2 REFERENCES

- A. Reference Standards:
 - 1. American National Standards Institute (ANSI):
 - a. ANSI C78.377-2017, 'American National Standard for Electric Lamps: Specification for the Chromaticity of Solid State Lighting Products'.
 - 2. Federal Communications Commission (FCC):
 - a. Code of Federal Regulations (CFR):
 - 1) FCC 47 CFR Part 18, 'Industrial, Scientific, and Medical Equipment'.
 - 3. Institute of Electrical and Electronics Engineers (IEEE):
 - a. IEEE C62.41.1-2002, 'Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits'.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Advance Transformer Co, Rosemont, IL www.advancetransformer.com.
 - 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.
- b. 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.
- C. Factory Assembly:
 - 1. Fixtures shall be fully assembled complete with necessary wiring, sockets, lamps, reflectors, ballasts, auxiliaries, plaster frames, recessing boxes, hangers, supports, lenses, diffusers, and other accessories essential for complete working installation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work:
 - 1. Coordinate with Sections under 09 5000 heading to obtain symmetrical arrangement of fixtures in acoustic tile ceiling as shown on Reflected Ceiling Plan in Contract.
 - 2. In mechanical equipment rooms, coordinate locations of light fixtures with equipment locations to provide proper room illumination without obstruction. Suspend fixtures that must be mounted below pipes, ducts, etc, with chains or other Architect approved method.
- B. Securely mount fixtures. Support fixtures weighing **50 lbs (23 kg)** or more from building framing or structural members.
- C. Where fluorescent fixtures are shown installed end to end, provide suitable connectors or collars to connect adjoining units to appear as a continuous unit.

3.2 ADJUSTMENT

- A. Repair scratches or nicks on exposed surfaces of fixtures to match original undamaged conditions.

END OF SECTION

SECTION 26 5200**EMERGENCY LIGHTING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install emergency battery units as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements'.

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Beghelli, Miramar, FL www.beghelliusa.com.
 - 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 (90) 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 (15 meters)** 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

SECTION 26 5600**EXTERIOR LIGHTING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install exterior lighting system as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements'.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Cutler-Hammer Inc, Milwaukee, WI www.cutler-hammer.eaton.com or Cutler-Hammer/Eaton Yale Ltd, Burlington, ON (905) 333-6442.
 - b. General Electric Industrial Systems, Charlotte, NC or G E Lighting Canada Inc, Mississauga, ON www.geindustrial.com.
 - c. Intermatic Inc, Spring Grove, IL www.intermatic.com.
 - d. Paragon Electric Co Inc, Carol Stream, IL www.icca.invensys.com/paragon or Paragon Electric / Maple Chase, Mississauga, ON (800) 951-5526 or (905) 890-5956.
 - e. Siemens Energy & Automation, Alphrata, GA www.sea.siemens.com or Siemens Canada, Mississauga, ON (905) 819-8000.
 - f. Square D Co, Palatine, IL or Square D / Schneider Electric, Toronto, ON www.squared.com.
 - g. Tork Inc, Mount Vernon, NY www.tork.com.
- B. Materials:
 - 1. Exterior Fixtures:
 - a. Finish shall be high quality polyester powder coating:
 - 1) Finish process shall consist of cleaning, electrostatically applying power coat, and thermal curing.
 - 2) Weather, scratch, UV, and fade resistant.
 - b. Color shall be Manufacturer's standard medium bronze as selected by Architect before bidding.
 - c. Type One Acceptable Products:
 - 1) As indicated on Fixture Schedule. Do not mix fixtures from different manufacturers for one use.
 - 2) Equals as approved by Architect before bidding. See Section 01 6200.
 - 2. Exterior Lighting Control:
 - a. Connect new fixtures to existing lighting control.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Lighting Control:

1. Locate photocell(s) outside building under soffit and away from any light source and direct sunlight.
2. Wire photocell and time switch in series for photo cell ON, time switch OFF operation.

END OF SECTION

DIVISION 28: ELECTRONIC SAFETY AND SECURITY

28 1000 ELECTRONIC ACCESS CONTROL

28 1602 DOOR ALARM SYSTEM

28 3000 ELECTRONIC DETECTION AND ALARM

28 3101 FIRE DETECTION AND ALARM SYSTEM

END OF TABLE OF CONTENTS

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SECTION 28 1602**DOOR ALARM SYSTEM****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install complete door alarm and notification security system as described in Contract Documents.
 - 2. Furnish and install magnetic door holders
 - 3. Furnish and install vinyl signs on alarmed doors.
- B. Related Requirements:
 - 1. Division 26: Provide conduit and boxes for system.

1.2 REFERENCES

- A. Reference Standards:
 - 1. National Fire Protection Association:
 - a. NFPA 731, 'Standard for the Installation of Electronic Premises Security Systems' (2017 or most recent edition adopted by AHJ).

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. Manufacturer Instructions:
 - a. Instruction manual that explains what is to be done in event of various indications.
 - 2. Operation and Maintenance Data:
 - a. Submit manufacturer's operation and maintenance data, customized to the system installed. Include system and operator manuals.
 - 3. Field Tests:
 - a. Submit results of field testing of every device including date, testing personnel, retesting date if applicable, and confirmation that every device passed field testing.

1.4 QUALITY ASSURANCE

- A. Manufacturer: Minimum ten years of experience in manufacturing and maintaining similar systems. Alarm manufacturer shall be certified compliant with ISO 9001.
- B. Installer: Minimum two years of experience installing similar systems, and acceptable to the manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's labeled packages. Store and handle in accordance with manufacturer's requirements, in a facility with environmental conditions within recommended limits.
- B. Store products in manufacturer's unopened packaging until ready for installation.

1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

PART 2 - PRODUCTS

2.1 SYSTEM

- A. Design Criteria:
 - 1. Basis-of-design shall be the Honeywell VISTA 20P Burglary System.
 - 2. Required Functionality of System:
 - a. Keyed switch for system shut off.
 - 1) Switching the alarm system to "off" position turns power to magnetic door holders "on."
 - 2) Switching the alarm system to "on" position turns power to magnetic door holders "off."
 - b. Magnetic door contacts:
 - 1) Install in zones so separate notification tones can be sounded depending on which side of building contacts are tripped.
 - c. Notification Appliances:
 - 1) Install dual tone devices and wire so separate notification tones can be sounded depending on which side of building contacts are tripped.
 - 3. System Power:
 - a. Alarm System shall operate using standard 120 volts AC, 50/60 Hz power.
 - b. Control Primary Power - Transformer power shall be 16.5 VAC, 40VA.
 - c. Backup Battery - A rechargeable 12 VDC, gel type, lead acid backup battery shall be provided. The battery shall be rated between 7 and 34-ampere hours (AH).
 - d. Alarm Power - Alarm power shall be 12 VDC, 1.0 amps for each bell output
 - e. Auxiliary Standby Power - Standby power shall be 12 VDC, 600 mA maximum.
 - f. Fusing - The battery input, auxiliary, and bell outputs shall be protected using PTC circuit breakers. All outputs shall be power limited.
 - 4. User interface options:
 - a. Keypad, Alpha Display: The system keypad shall include a two-line, alphanumeric LCD display. The installer shall follow manufacturer's installation instructions when installing system equipment.
 - 5. The Control Panel shall be enclosed in a metal cabinet, suitable for wall mounting. The dimensions shall not exceed 14.5 inches (36.8 cm) in height, 12.5 inches (31.8 cm) in width or 3 inches (7.6 cm) in depth.
- B. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. ADI, Melville, NY www.adiglobal.us.
 - b. Edwards Signaling & Security, Plainville, CT www.edwards-signals.com.
 - c. Honeywell Security, Atlanta, GA www.security.honeywell.com.
 - d. Seton Signs, www.seton.com
 - e. SimplexGrinnell, Westminster, MA www.simplexgrinnell.com.
- C. Door Alarm System Components:
 - 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

- a. Control Panel:
 - 1) Honeywell: ADEMCO Vista 20P with ADEMCO 1361 transformer, 120VAC to 16.5VAC, 40 VA.
 - b. Batteries:
 - 1) Panasonic YA-NP712, or equal. 12VDC, 4.5Ah minimum rating for back-up power to panel and auxiliary power supply.
 - c. Battery Enclosure:
 - 1) ADI: BW-BW106BC, 12 inch by 12 inch by 4 inch.
 - d. Keypads:
 - 1) Honeywell: ADEMCO 6160. Two-line, 32 character, alpha-numeric-custom LCD display.
 - e. Key Switch:
 - 1) Honeywell ADEMCO 4146 Keyswitch
 - f. Door Security Contacts:
 - 1) Honeywell: ADEMCO 947-75T White. Close loop, 3/4 inch with 1/2 inch gap.
 - g. Notification Appliances: Chimes
 - 1) W Box by ADI: 0E-1GANGCHIM
 - 2) Single Gang 3 Tone Flush Mount Chime
2. Additional components:
 - a. Any additional components required to provide system functionality, including relays, partitions, expansion zones, shall be provided and installed as part of the complete system.
 - b. All such components shall be compatible with the system and approved by Honeywell as part of the system. Where possible, parts shall be manufactured by Honeywell.
- D. Door Hold / Release Devices:
1. Door release units shall be electrically operated magnetic devices which hold doors open until released by smoke detector.
 2. 120 V, 60 Hz operation.
 3. Semi-flush mounting of electromagnet.
 4. Stainless steel armature.
 5. Type One Acceptable Products:
 - a. Simplex: 2088-9608.
 - b. Edwards: 1505-N5.
 - c. Equal as approved by Architect before bidding. See Section 01 6200.
- E. Decal Alarm Sticker:
1. Install Self-Adhesive Vinyl sign at each alarmed door: "Do Not Open Door Alarm Will Sound"
 - a. Luminous on Red, Glow in the Date, Not Laminated.
 2. Type One Acceptable Products:
 - a. Seton Signs: Style No. 21518 Self-Adhesive Vinyl Sign
 - b. Equal as approved by Architect before bidding. See Section 01 6200.
- F. Accessories and Cabling:
1. Type One Acceptable Products:
 - a. Communications Cabling:
 - 1) Honeywell: AK 3740A. AWG # 18 red jacketed cable, 1 pair (red / yellow), shielded, acceptable for free air and non-plenum installations.
 - 2) Equal as approved by Architect before bidding. See Section 01 6200.
 - b. Power Cabling:
 - 1) Honeywell: AK 3740A. AWG # 18 red jacketed cable, 1 pair (red / black), shielded, acceptable for free air and non-plenum installations.
 - 2) Equal as approved by Architect before bidding. See Section 01 6200.
 - c. Keypad Cabling:
 - 1) Honeywell: AK 3742A. AWG # 18 red jacketed cable, 2 pair, shielded, acceptable for free air installations.
 - 2) Equal as approved by Architect before bidding. See Section 01 6200.
 2. Class Two Quality Products:
 - a. Communications Cabling:
 - 1) AWG # 22 jacketed cable, 1 pair, acceptable for free air and non-plenum installations.
 - 2) Use plenum rated where required.

- b. Power Cabling:
 - 1) AWG # 18 jacketed cable, 2 pair, acceptable for free air and non-plenum installations.
 - 2) Use plenum rated where required.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine site conditions prior to installation. Notify Architect and Owner in writing if unsuitable conditions are encountered. Do not start installation until site conditions are acceptable.

3.2 INSTALLATION

- A. Door alarm control panel system shall be installed and tested in accordance with manufacturer's installation instructions.
 - 1. Coordinate interfaces with Owner's representative where appropriate.
 - 2. Provide backboxes, pullboxes, connectors, supports, conduit, cable, and wire for a complete and reliable installation. Obtain Owner's approval for exact location of all boxes, conduit, and wiring runs prior to installation.
 - 3. Install conduit, cable, and wire parallel and square with building lines, including raised floors areas. Do not exceed forty percent fill in conduits. Gather wires and tie to create an orderly installation.
 - 4. Conductors shall be continuous. Do not splice cables.
 - 5. Label and identify both ends of each jacketed cable with project cable number. Labels shall be Brady or equivalent.
 - 6. Conceal cable to door contacts. Exposed cable on interior finished surfaces not permitted.
 - 7. Coordinate with other trades to provide proper sequencing of installation.
 - a. Coordinate installation with storefront door installer for concealed door contacts..
- B. Mounting Heights:
 - 1. Unless otherwise indicated, mount center of outlets or boxes at following heights above finish floor:
 - a. Control Panel: 48 inches
 - b. Keypad: 48 inches
 - c. Key Switch: 48 inches
 - d. Notification Appliances: 78 inches
- C. Install End Of Line zone resistors at device monitored devices. Install EOL resistors in door frame with door contact and protect with jacketing or shrink-tube.

3.3 FIELD QUALITY CONTROL

- A. Field Tests:
 - 1. Conduct tests of system in presence of Owner and show system to be free of defective workmanship and materials.
- B. Field Commissioning: Test system as recommended by manufacturer, including the following:
 - 1. Conduct complete inspection and testing of equipment, including verification of operation with connected equipment.
 - 2. Test devices and demonstrate operational features for Owner's representative and authorities having jurisdiction as applicable.
 - 3. Correct deficiencies until satisfactory results are obtained.
 - 4. Submit written copies of test results.

3.4 CLOSEOUT ACTIVITIES

- A. Instruction Of Owner:
 - 1. Instruct Owner's representative in proper operation and maintenance procedures.
 - 2. Conduct on-site system training, with the number of sessions and length of sessions as recommended by the manufacturer. Training shall include administration, provisioning, configuration, operation and diagnostics.

3.5 PROTECTION

- A. Protect conductors from cuts, abrasion, and other damage during construction.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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SECTION 28 3101**FIRE DETECTION AND ALARM SYSTEM****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install modifications and additions to existing fire alarm and detection system as described in Contract Documents.
 - a. This specification is provided for general provisions. Contractor and installer shall field verify and match manufacturer and parts of existing system and follow all manufacturer's instructions for installation and repairs.
 - b. Contractor is responsible for design for modifications noted in Contract Documents and shall coordinate all related permits and reviews with the local fire jurisdiction prior to installation of work.
 - 2. Furnish and install raceway, cable and conductors, boxes, and miscellaneous items necessary for complete system.
- B. 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 information 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. Contractor is responsible to field verify existing system manufacturer
 2. Category Three Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Contact Information: Steve Nichols, Honeywell Account Manager, at (801) 244-8304 for National account pricing:
 - 1) Fire-Lite Alarms, Northford, CT www.firelite.com.
 - 2) Silent Knight Security Systems, Northford CT www.silentknight.com.
 3. 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. Class A loop type initiating device circuits and Class A loop type notification appliance circuits.
 - 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.
 - 4) Indicate zone or device in alarm on remote annunciator.
- 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.
- 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 (57 deg C) 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 deg C).
 - 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.
4. Notification Appliances:
 - a. Color: White.
 - b. Combination Horn / Strobe:
 - 1) Ceiling mount, semi-flush.
 - 2) Wall mounted flush or semi-flush.
 - 3) Non-coded audible output of 90 dB minimum at 10 feet (3 meters).
 - 4) Integrally mounted flashing light unit with block letters 'FIRE.' Minimum light intensity of 15 candela and flash rate between one and three Hertz.
 - 5) 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 (1 800 mm) to top.
 - 2) Wall-Mounted Horn / Strobe: 80 inches (2 1032 mm). 6 inches (150 mm) below ceiling, whenever ceiling is below 80 inches (2 1032 mm).
 - 3) Wall-Mounted Strobe: 80 inches (2 1032 mm). 6 inches (150 mm) below ceiling, whenever ceiling is below 80 inches (2 1032 mm).
 - 4) Manual pull stations: 48 inches (1 200 mm).
 - 5) Remote annunciator panel: 60 inches (1 500 mm).
 2. Locate fire alarm manual stations 24 inches (600 mm) 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 (208 mm by 205 mm) 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 (900 mm) of air discharge grilles. Do not install manual fire alarm boxes within 24 inches (610 mm) 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 1000 SITE CLEARING

31 1123 AGGREGATE BASE

31 2000 EARTH MOVING

31 2213 ROUGH GRADING

31 2216 FINE GRADING

31 2316 EXCAVATION

31 2323 FILL

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:
 - 3. Section 32 9001: 'Common Planting Requirements':
 - a. Pre-installation conference held jointly with other landscape related sections.

1.2 REFERENCES

- A. Definitions:
 - 1. Aggregate Base: Layer of granular material immediately below concrete and asphalt paving or miscellaneous site concrete (sidewalks, curbs, etc) and below interior concrete slabs on grade.
 - 2. Base: See aggregate base.
 - 3. Building Grading: sloping of grounds immediately adjacent to building. Proper grading causes water to flow away from a structure. Grading can be accomplished either with machinery or by hand.
 - 4. Compacted Fill: Placement of soils on building site placed and compacted per Contract Documents. Used to replace soils removed during excavation or to fill in low spot on building site.
 - 5. Excavation: Removal of soil from project site or cavity formed by cutting, digging or scooping on project site.
 - 6. Fine Grading (FG): Preparation of subgrade preceding placement of surfacing materials (aggregate base, asphalt or concrete paving, and topsoil) for contour of building site required. Fine Grading is conducted to ensure that earth forms and surfaces have been properly shaped and subgrade has been brought to correct elevations. It is performed after rough grading and placement of compacted fill but before placement of aggregate base or topsoil.
 - 7. Finish Grading: Completed surface elevation of landscaping areas for seeding, sodding, and planting on building site.
 - 8. Natural Grade: Undisturbed natural surface of ground.
 - 9. Rough Grading (RG): Grading, leveling, moving, removal and placement of existing or imported soil to its generally required location and elevation. Cut and fill is part of rough grading.
 - 10. Subgrade (definition varies depending upon stage of construction and context of work being performed):
 - a. Prepared natural soils on which fill, aggregate base, or topsoil is placed.
 - or
 - b. Prepared soils immediately beneath paving or topsoil.
 - 11. Topsoil Placement and Grading: Topsoil placement and finish grading work required to prepare site for installation of landscaping.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in MANDATORY 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 1123: 'Aggregate Base'.
 - 3) Section 31 2213: 'Rough Grading'.
 - 4) Section 31 2216: 'Fine Grading'.
 - 5) Section 31 2316: 'Excavation'.
 - 6) Section 31 2323: 'Fill'.
- c. In addition to agenda items specified in Section 01 3100, review following:
- 1) Review Geotechnical Evaluation Report.
 - 2) Review common earthwork schedule.
 - 3) Review protection requirements.
 - 4) Review cleaning requirements.
 - 5) Review safety issues.
 - 6) Review field tests and inspections requirements.
- d. In addition to agenda items specified above, review following. These are items that will occur before pre-installation conference for landscape sections:
- 1) Review clearing and grubbing requirements.
 - 2) Review topsoil stripping and stockpiling requirements.
 - 3) Review landscape grading requirements.
 - 4) Review landscape finish grade tolerance requirements.
 - 5) Review landscape and plant tolerances.
 - 6) Review surface preparation of landscape and planting areas.
 - 7) Review additional agenda items as specified in related sections listed above.
2. Participate in pre-installation conference for landscape sections as specified in Section 32 9001:
- a. Schedule pre-installation conference after completion of Fine Grading specified in Section 31 2216, but one (1) week minimum before beginning landscape work and held jointly with following sections:
- 1) Section 32 8423: 'Underground Sprinklers'.
 - 2) Section 32 9120: 'Topsoil And Placement'.
 - 3) Section 32 9121: 'Topsoil Physical Preparation' (section included based on Topsoil Testing Report).
 - 4) Section 32 9122: 'Topsoil Grading'.
 - 5) Section 32 9223: 'Sodding'.
 - 6) Section 32 9300: 'Plants'.
- b. In addition to agenda items specified in Section 01 3100 and Section 32 9001, review following that these items have been installed correctly:
- 1) Review topsoil placement requirements.
 - 2) Review topsoil surface preparation requirements.
 - 3) Review topsoil depth requirements.
 - 4) Review landscape finish grade tolerance requirements.
 - 5) Review surface preparation of landscape and planting areas.
- B. Sequencing:
1. General Earthwork:
 - a. Excavation.
 - b. Rough Grading.
 - c. Fill.
 - d. Fine Grading.
 - e. Aggregate Base or Topsoil Grading.

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.
 - 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 <USA (Underground Service Alert)> 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. Existing Plants And Features:
 - a. Do not damage tops, trunks, and roots of existing trees and shrubs on site that are intended to remain.
 - b. Do not use heavy equipment within branch spread.
 - c. Interfering branches may be removed only with permission of Architect.
 - d. Do not damage other plants and features that are to remain.

3.3 REPAIR / RESTORATION

- A. Replace broken or damaged covers, boxes, and vaults.

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. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform The Work or Contractor's own Testing and Inspection services.
 2. Testing and inspection of earthwork operations is required.
 3. 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.
4. 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 1123**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 concrete slabs-on-grade.
 - 2) Miscellaneous exterior concrete (sidewalks, curb, gutter and equipment pads).
- B. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
 - 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'.
 - 4. 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.
 - 5. Section 31 2213: 'Rough Grading'.
 - 6. Section 31 2216: 'Fine Grading' for subgrade procedures.
 - 7. Section 31 2323: 'Fill' for compaction procedures and tolerances.

1.2 REFERENCES

- A. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C131/C131M-14, 'Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine'.
 - b. ASTM D1556/D1556M-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method'.
 - c. ASTM D1557-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))'.
 - d. ASTM D1883-16, 'Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils'.
 - e. ASTM D2167-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method'.
 - f. ASTM D2419-14, 'Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate'.
 - g. ASTM D4318-10, 'Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils'.
 - h. ASTM D6938-17, 'Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)'.
 - i. ASTM E1643-11(2017), 'Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in MANADORY 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 aggregate base installation requirements.
 - c. Review proposed miscellaneous exterior concrete schedule.
 - d. 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. Compaction as described in Section 31 2216 'Fine Grading'.
 - 2. Exterior Footings and Foundations are installed.
 - 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 Testing Agency and Architect twenty-four (24) hours minimum before installation of interior concrete slabs to allow inspection of aggregate base.
 - b. Allow special inspector to review all sub grades and excavations to determine if building pad has been prepared in accordance with geotechnical report 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.

1.4 SUBMITTALS

- A. Closeout Submittals:
- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Testing and Inspection Reports:
 - a) Testing Agency Testing and Inspecting Reports of aggregate base.

1.5 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'.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 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.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aggregate Base:
 - 1. Under Interior Slab-On-Grade Concrete (Section 03 3111 'Cast-In-Place Structural Concrete'):
 - a. New Aggregate Base:
 - 1) Gravel: 3/4 inch 18mm minimum to one inch 25 mm maximum well-graded, clean gravel or crushed rock.
 - 2) Base type gravel or crushed rock, graded by weight as follows (three-quarter to one-inch clean gap-graded gravel):
 - a) Road Base type gravel or crushed stone (slag not allowed), graded as follows:

(1) Sieve		Percent of Weight Passing
(a) 1 inch	(25.4 mm)	100
(b) 3/4 inch	(19.0 mm)	90 - 80
(c) 1/2 inch	(12.7 mm)	20 - 40
(d) 3/8 inch	(9.5 mm)	5 - 10
(e) No. 4	(4.750 mm)	0 - 12
 - 2. Under Exterior Concrete (Section 03 3111 'Cast-In-Place Structural Concrete'):
 - a. New Aggregate Base:
 - 1) 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 (4.57 m). 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.

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. Under interior concrete slab-on-grade aggregate base:
 - a. Place **4 inches (100 mm)** minimum of aggregate base, level, and compact with vibratory plate compactor.
 3. Under miscellaneous exterior concrete aggregate base:
 - a. Except under mow strips, place **4 inches (100 mm)** 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. (232 sq. m)** 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. (930 sq. m)** or less of exterior pads area but no fewer than three tests.

END OF SECTION

SECTION 31 2213

ROUGH GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Perform rough grading work required to prepare site for construction as described in Contract Documents.

- B. Related Requirements:
 - 1. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - 2. Section 03 3053: Miscellaneous Exterior Cast-In-Place Concrete.
 - 3. 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.
 - 4. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
 - 5. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
 - 6. Section 31 2316: 'Excavation'.
 - 7. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in MANDATORY 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. Identify benchmark to be used in establishing grades and review Contract Document requirements for grades, fill materials, and topsoil.
 - b. Examine site to pre-plan procedures for making cuts, placing fills, and other necessary work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials used for fill shall be as specified for backfill in Section 31 2323 'Fill'.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
 - 1. Verify elevations of rough grading are correct before compacted fill, fine grading, aggregate base or landscape grading are placed.

3.2 PREPARATION

- A. Protection Of In-Place Conditions:
 - 1. When existing grade around existing plants to remain is higher than new finish grade, perform regrading by hand.

2. Do not expose or damage shrub or tree roots.

3.3 PERFORMANCE

A. Subgrade (Natural Soils):

1. Subgrade beneath compacted fill or aggregate base under asphalt or concrete paving shall be constructed smooth and even.

B. Special Techniques:

1. Compact fills as specified in Section 31 2323 'Fill'.
2. If soft spots, water, or other unusual and unforeseen conditions affecting grading requirements are encountered, stop work and notify Architect.

C. Tolerances:

1. Maximum variation from required grades shall be **1/10 of one foot (28 mm)**.

END OF SECTION

SECTION 31 2216**FINE GRADING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Perform fine grading of subgrade work required to prepare site for paving finish grading and for placement of topsoil as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
 - 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 3. 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.
 - 4. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
 - 5. Section 31 2213: 'Rough Grading' for grading and preparation of natural soil subgrades below fill and aggregate base materials.
 - 6. Section 31 2316: 'Excavation'.
 - 7. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference as specified in Section 31 0501 and Section 32 9001.
 - 2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
 - a. Review backfill requirements.
 - b. Review geotechnical report.
 - c. 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 installation of fill / engineered fill to allow inspection.
 - 2. 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, aggregate base or concrete.
 - 3. 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. Record Documentation:
 - 1) Testing and Inspection Reports:
 - 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'.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection Of In-Place Conditions: Protect utilities and site elements from damage.
- B. General:
 - 1. Limit use of heavy equipment to areas no closer than **6 feet (1.80 meter)** from building or other permanent structures.
- C. Surface Preparation:
 - 1. Landscaping and Planting Areas:
 - a. Before grading, dig out weeds from planting areas by their roots and remove from site. Remove rocks larger than **1-1/2 inches (38 mm)** in size and foreign matter such as building rubble, wire, cans, sticks, concrete, etc.
 - b. Remove imported paving base material present in planting areas down to natural subgrade or other material acceptable to Architect.

3.2 PERFORMANCE

- A. Interface With Other Work: Do not commence work of this Section until grading tolerances specified in Section 31 2213 are met.
- B. General:
 - 1. Do not expose or damage existing shrub or tree roots.
- C. Tolerances:
 - 1. Site Tolerances:
 - a. Subgrade (material immediately below aggregate base):
 - 1) **0.00 inches (0.00 mm)** high.
 - 2) Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.
 - b. Maximum variation from required grades shall be **1/10 of one foot (28 mm)**.
 - 2. Slope grade away from building as specified in Section 32 9120.

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. Site Preparation:
 - a. Prior to placement of fill / engineered fill, inspector shall determine that site has been prepared in accordance with geotechnical report.
 - b. Footing subgrade: At footing subgrades, Certified Inspector is to verify that soils conform to geotechnical report.
3. Fill / Engineered Fill:
 - a. Testing Agency shall provide testing and inspection for fine grading.
 - 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.

END OF SECTION

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SECTION 31 2316

EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Perform Project 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. Section 31 1100: Clearing and Grubbing.
 - 3. Section 31 1123: 'Aggregate Base'.
 - 4. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
 - 5. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
 - 6. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.
 - 7. 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 MANDATORY 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 existing utility lines not identified in Contract Documents are encountered, contact Architect before proceeding.

3.3 PERFORMANCE

- A. Interface With Other Work:
1. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
 2. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
- B. Excavation:
1. Building Footings And Foundations:
 - a. No overexcavation is anticipated.
 - b. Bottom of excavations to receive footings shall be undisturbed soil.
 - c. Excavation Carried Deeper Than Required:
 - 1) Under Footings: Fill with concrete specified for footings.
 - 2) Under Slabs: Use specified compacted backfill material.
 2. Miscellaneous Cast-In-Place Concrete:
 - a. Excavate as necessary for proper placement and forming of concrete site elements. Remove vegetation and deleterious material and remove from site.
 - b. Backfill over-excavated areas with compacted base material specified in Section 31 1123.
 - c. Remove and replace exposed material that becomes soft or unstable.
 3. 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 (100 mm)** 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 (100 mm)** 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.
 4. 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, except as specified below.
 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 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 3. 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.
 4. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
 5. Section 31 2213: 'Rough Grading' for grading and preparation of natural soil subgrades below fill and aggregate base materials.
 6. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
 7. Section 31 2316: 'Excavation'.
 8. Division 32: Compaction of subgrade under walks and paving.
 9. Performance of backfilling and compacting 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 REFERENCES

- A. Reference Standards:
1. ASTM International (Following are specifically referenced for fill and aggregate base testing):
 - a. ASTM D698-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³))'.
 - b. ASTM D1556/D1556M-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method'.
 - c. ASTM D1557-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))'.
 - d. ASTM D2167-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method'.
 - e. ASTM D2487-11, 'Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)'.
 - f. ASTM D6938-15, 'Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
1. Participate in MANDATORY 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 2324 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. 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 twenty-four (24) hours minimum before installation of fill / engineered 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.

1.4 SUBMITTALS

- A. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Testing and Inspection Reports:
 - a) Testing Agency Testing and Inspecting Reports of fill / engineered fill.

1.5 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'.

1.6 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.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Site Material:

1. Existing excavated material on site is suitable for use as fill and backfill to meet Project requirements.
- B. Imported Fill / Backfill:
1. Well graded material conforming to ASTM D2487 free from debris, organic material, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.
 - a. Under Building Footprint And Paved Areas: Fill shall comply with soil classification groups GW, CL, GP, GM, SW, SP, or SM. Fill may not contain stones over **6 inches (150 mm)** diameter and ninety-five (95) percent minimum of fill shall be smaller than **1-1/2 inch (38 mm)** in any direction.
 - b. Under Landscaped Areas:
 - 1) Fill more than **36 inches (900 mm)** below finish grade shall comply with soil classification groups GW, CL, GP, GM, SW, SP, or SM. Fill may not contain stones over **6 inches (150 mm)** diameter and ninety (90) percent minimum of fill shall be smaller than **1-1/2 inch (38 mm)** in any direction.
 - 2) Fill less than **36 inches (900 mm)** below finish grade shall comply with soil classification groups SW, SP, SM, or SC. Fill may not contain stones larger than **1-1/2 inches (38 mm)** in any direction and ninety (90) percent minimum of fill shall be smaller than **3/8 inch (4.7 mm)** in any direction.
- C. Engineered Fill:
1. Not required for this project.

PART 3 - EXECUTION

3.1 PREPARATION

- A. 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 (150 mm)** deep, moisture condition to uniform moisture content of between optimum and four (4) percent over optimum, and mechanically tamp **6 inches (150 mm)** deep to ninety-five (95) percent minimum of relative compaction.
 3. Under Driveways And Parking Areas:
 - a. Scarify subgrade **6 inches (150 mm)** 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 (150 mm)** 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. Landscape Areas:
 - a. Compact subgrade to eighty-five (85) percent relative compaction.

3.2 PERFORMANCE

- A. Interface With Other Work:
1. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
 2. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
 3. Section 31 2324: 'Flowable Fill' for backfilling of piping systems and other utilities under paving'.
- B. Fill / Backfill:
1. General:

- a. Around Buildings And Structures: Slope grade away from building as specified in Section 31 2216. Hand backfill when close to building or where damage to building might result.
 - b. Site Utilities:
 - 1) In Landscape Areas: Use backfill consisting of on-site soil.
 - 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 (76 mm)** 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 (200 mm)** 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 (200 mm)** 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 (300 mm)** 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 (300 mm)** of finish grade.
 - (3) Compact fill above **12 inches (300 mm)** to eighty-five (85) percent relative compaction.
 - b) Under Slabs:
 - (1) Under Slabs: Place fill in **6 inch (150 mm)** 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 (100 mm)** of finish grade.
 - (2) Final **4 inches (100 mm)** of fill shall be aggregate base as specified in Section 31 1123.
 - 5) Fill Slopes: Compact by rolling or using sheepsfoot roller.
 - 6) Backfill Under Footings if required by Geotechnical Evaluation Report.
 - 7) Landscape Areas:
 - a) Compact fill to eighty-five (85) percent minimum relative compaction.
 - 8) Other Backfills: Place other fills in **12 inch (300 mm)** layers and compact to ninety five (95) percent relative compaction.
 - 9) 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. (930 sq. m) 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 on test for every 2,500 sq. ft. (232 sq. m) 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 (12 linear m) or less of wall length, but no fewer than two (2) tests.
 - 4) Trench Backfill: At each 12 inch (305 mm) compacted lift for each 100 linear feet (30.5 linear m) 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 (12 linear m) or one (1) test for every 5,000 sq. ft. (465 sq. m) or less of pad area but no fewer than three (3) tests.
- g. Required verification and inspection of soils as referenced in 2015 IBC (or latest approved edition) Table 1704.7 'Required Verification And Inspection Of Soils'. Periodic and continuous inspections include:
 - 1) Verify materials below shallow foundations 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

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