

project manual

THE CHURCH OF
JESUS CHRIST
OF LATTER-DAY SAINTS

MIDVALLEY 5,7
SANDY UT MIDVALLEY STAKE
1175 EAST 7800 SOUTH, SANDY, UT
PROJECT NUMBER: 5135117



bradley gygi architect & associates, pllc

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Professional Consultants



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BIDDING REQUIREMENTS

FOR PROJECTS (U.S.)

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INVITATION TO BID (U.S.)

1. CONTRACTORS INVITED TO BID THE PROJECT:

To be announced

2. PROJECT:

Midvalley 5,7
Sandy UT Midvalley Stake

3. LOCATION:

1175 East 7800 South
Sandy, UT

4. OWNER:

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

Steven Smith, Facility Manager
Sandy UT FM Group
625 East 8400 South, Suite A
Sandy, UT 84070-0525

5. CONSULTANT:

Bradley Gygi Architect & Associates, PLLC
2150 South 1300 East, Suite 500
Salt Lake City, UT 84106

6. DESCRIPTION OF PROJECT:

- A. Exterior ramp and Outside Storage Building.
- 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, date and place to be announced. Bids will be publicly opened at time, date and 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 # (800) 830-3182
Fax # (859) 885-1091
email: sherry.roe@mhfi.com
 - Steps for downloading from McGraw-Hill Dodge: Purchasing Individual Reports/Plans/Specs/Addenda from Dodge Data and Analytics
 1. Access the web-page <http://dodgeprojects.construction.com/>
 2. 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.
 3. 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 correction documents.
 4. 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. Hard Copy and electronic copy Bidding Documents will be provided to invited Contractors. Hard Copies shall be returned to the Architect 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) Contractor Bid Proposal and Project Agreement (U.S.)
 - 2) Other documents included by reference
 - 3) Addenda.
- B. Bidding Requirements are those documents identified as such in proposed Project Manual.
- C. Addenda are written or graphic documents issued prior to execution of the Contract which modify or interpret the Bidding Documents. They become part of the Contract Documents as noted in the Contractor Bid Proposal and Project Agreement (U.S.) upon execution of the Agreement by Owner.

2. BIDDER'S REPRESENTATIONS:

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

3. BIDDING DOCUMENTS:

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

4. BIDDING PROCEDURES:

- A. Form and Style of Bids

- 1) Use Owner's Bid Form titled "Contractor Bid Proposal and Project Agreement (U.S.)".
- 2) Bid will be complete and executed by authorized representative of Bidder.
- 3) Do not delete from or add to the information requested on bid form.

B. Submission of Bids

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

C. Modification or Withdrawal of Bid

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

5. CONSIDERATION OF BIDS:

A. Opening Of Bids - See Invitation to Bid.

B. Acceptance Of Bid

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

6. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:

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

7. MISCELLANEOUS:

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

B. Examination Schedule for Existing Building and Site

- 1)

END OF DOCUMENT

INFORMATION AVAILABLE TO BIDDERS (U.S.)

1. ASBESTOS-CONTAINING MATERIAL (ACM)

- A. The building upon which work is being performed has been examined for asbestos-containing material. Owner will provide a report to the Contractor to maintain on site during construction activities.
- B. Refer to Section 01 3500, Article 1.3 "Environmental Procedures" for requirements to be followed.

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

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

1. **Property/Project.**

Property/Project Number: 5135117
Property Address ("Project Site"): 1175 East 7800 South, Sandy, UT
Project Type: R&I, Exterior Ramp and Outside Storage Building
Project Name ("Project"): Midvalley 5,7
Stake Name: Sandy UT Midvalley Stake

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

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

- a. This Agreement;
- b. Supplementary Conditions for Bid Proposal and Project Agreement (U.S.);
- c. The Specifications (Division 01 and Divisions 03 through 26);
- d. Drawings entitled and dated Midvalley 5,7 8 June 2017;
- e. Addendum No. with date(s) _____; and
- f. All written Field Changes, written Construction Change Directives and written Change Orders when prepared and signed by Owner and Contractor.

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

5. **Payment.**

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

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

7. **Correction of Work.** Contractor will promptly correct, at its own expense,
 - a. any portion of the Work which
 - 1) fails to conform to the requirements of the Contract Documents, or
 - 2) is rejected by the Owner as defective or because it is damaged or rendered unsuitable during installation or resulting from failure to exercise proper protection.
 - b. any defects due to faulty materials, equipment, or workmanship which appear within a period of one year from the date of Substantial Completion or within such longer period of time as may be prescribed by law or the terms of any applicable special warranty required by the Contract Documents.

8. **Time of Completion.** Contractor will complete the Work and have it ready for Owner's inspection within sixty (60) calendar days from Notice to Proceed issued by Owner. Time is of the essence. If Contractor is delayed at any time in the progress of the Work by any act or neglect of Owner, or by changes in the Work, or by strikes, lockouts, unusual delay in transportation, unavoidable casualties, or acts of nature beyond Contractor's control, then the time for completion will be extended by the time that completion of the Work is delayed. However, Contractor expressly waives any damages for any such delays other than those delays willfully caused by Owner.

9. **Permits, Surveys, and Taxes.** Contractor will obtain and pay for all permits and licenses, and also pay any applicable taxes. Contractor will also obtain and pay for any surveys it needs to perform the Work. Contractor will conform to all ordinances and covenants governing the Project Site and/or Work.

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

11. **Payment of Subcontractors and Materialmen.** Contractor will promptly pay for all labor, materials, and equipment used to perform the Work.

12. **Contractor's Insurance.** Prior to performing any work, Contractor will obtain and maintain during the term of this Agreement the following insurance:
 - a. Workers Compensation Insurance.
 - b. Employers Liability Insurance with minimum limits of the greater of \$500,000 E.L. each accident, \$500,000 E. L. disease-each employee, \$500,000 E.L. disease-policy limit or as required by the law of the state in which the Project is located.
 - c. Commercial General Liability Insurance – ISO Form CG 00 01 (12/07) or equivalent Occurrence policy which will provide primary coverage to the additional insureds (the Owner and the Architect) in the event of any Occurrence, Claim, or Suit with:
 - 1) Limits of the greater of: Contractor's actual coverage amounts or the following:
 - a) \$2,000,000 General Aggregate;
 - b) \$2,000,000 Products - Comp/Ops Aggregate;
 - c) \$1,000,000 Personal and Advertising Liability;
 - d) \$1,000,000 Each Occurrence; and
 - e) \$50,000 Fire Damage to Rented Premises (Each Occurrence)
 - 2) Endorsements attached to the General Liability policy including the following or their equivalent:
 - a) ISO Form CG-25-03 (05/09), Amendment of Limits of Insurance (Designated Project or Premises) describing the Agreement and specifying limits as shown above.
 - b) ISO Form CG 20 10 (07/04), Additional Insured – Owners, Lessees, Or Contractors (Form B), naming Owner and Architect as additional insureds.
 - d. Automobile Liability Insurance, with:
 - 1) Combined Single Limit each accident in the amount of \$500,000 or Contractor's actual coverage, whichever is greater; and
 - 2) Coverage applying to "Any Auto" or its equivalent.

Contractor will provide evidence of these insurance coverages to Owner by providing an ACORD 25 (2010/05) Form or its equivalent: (1) listing Owner as the Certificate Holder and Additional Insured on the general liability and any excess liability policies, (2) listing the insurance companies providing coverage (all companies listed must be rated in A.M. Best Company Key Rating Guide-Property-Casualty and each

company must have a rating of B+ Class VII or higher), (3) attaching the endorsements set forth above for the Certificate of Liability Insurance, and (4) bearing the name, address and telephone number of the producer and signed by an authorized representative of the producer. (The signature may be original, stamped, or electronic.) Notwithstanding the foregoing, Owner may, in writing and at its sole discretion, modify these insurance requirements.

13. **Independent Contractor Relationship.** The parties expressly agree that Contractor is not an agent or employee of Owner but is an independent contractor solely responsible for all expenses relating to Contractor's business.
14. **Comply with Intellectual Property Rights of Others.** Contractor represents and warrants that no Work (with its means, methods, goods, and services attendant thereto), provided to Owner will infringe or violate any right of any third party and that Owner may use and exploit such Work, means, methods, goods, and services without liability or obligation to any person or entity (specifically and without limitation, such Work, means, methods, goods, and services will not violate rights under any patent, copyright, trademark, or other intellectual property right or application for the same).
15. **Confidentiality / Property Rights.**
 - a. Owner will retain ownership and intellectual property rights in all plans, designs, drawings, documents, concepts, and materials provided by or on behalf of Owner to Contractor and to all work products of Contractor for or relative to Work performed under this Agreement, such products, services, and Work of Contractor constituting works made for hire. Contractor will not reuse any portions of such items provided by Owner or developed by Contractor for Owner pursuant to this Agreement, or disclose any such items to any third party without the prior written consent of Owner. Owner may withhold its consent in its' absolute discretion.
 - b. In addition, Contractor shall ensure that Contractor, Subcontractors, and the employees, agents and representatives of Contractor and its Subcontractors maintain in strict confidence, and shall use and disclose only as authorized by Owner all Confidential Information of Owner that Contractor receives in connection with the performance of this Agreement. Notwithstanding the foregoing, Contractor may use and disclose any information to the extent required by an order of any court or governmental authority, but only after it has notified Owner and Owner has had an opportunity to obtain reasonable protection for such information in connection with such disclosure. For purposes of this Agreement, "Confidential Information" means:
 - 1) The name or address of any affiliate, customer or contractor of Owner or any information concerning the transactions of any such person with Owner;
 - 2) Any information relating to contracts, agreements, business plans, budgets or other financial information of Owner to the extent such information has not been made available to the public by the Owner; and
 - 3) Any other information that is marked or noted as confidential by the Owner at the time of its disclosure.
16. **Ownership and Use of Renderings and Photographs.** Renderings representing the Work are the property of Owner. All photographs of the Work, whether taken during performance of the Work or at completion, are the property of the Owner. The Owner reserves all rights including copyrights to renderings and photographs of the Work. No renderings or photographs shall be used or distributed without written consent of the Owner.
17. **Public Statements Regarding Work or Property.** Contractor will not make any statements or provide any information to the media about the Work or Property without the prior written consent of Owner. If Contractor receives any requests for information from media, Contractor will refer such requests to Owner.
18. **No Commercial Use of Transaction or Relationship.**
 - a. Without the prior written consent of Owner, which Owner may grant or withhold in its sole discretion, neither Contractor nor Contractor's affiliates, officers, directors, agents, representatives, shareholders, members, Subcontractors, or employees shall make any private commercial use of their relationship to Owner or the Work or Property, including, without limitation:
 - 1) By referring to this Agreement, Owner, or the Work or Property verbally or in any sales, marketing or other literature, letters, client lists, press releases, brochures or other written materials except as may

- be necessary for Contractor to perform Contractor's obligations under the terms of this Agreement;
- 2) By using or allowing the use of any photographs of the Work or any part thereof, or of any service marks, trademarks or trade names or other intellectual property now or which may hereafter be associated with, owned by or licensed by Owner in connection with any service or product; or
 - 3) By contracting with or receiving money or anything of value from any person or commercial entity to facilitate such person or entity obtaining any type of commercial identification, advertising or visibility in connection with the Work or Property.

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

19. **Indemnity and Hold Harmless.**

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

20. **Resolution of Disputes.** In the event there is any dispute arising under the Contract Documents which cannot be resolved by agreement between the parties, either party may submit the dispute with all documentation upon which it relies to Director of Architecture, Engineering, and Construction, 50 East North Temple, Salt Lake City, Utah 84150, who will convene a dispute resolution conference within thirty (30) days. The dispute resolution conference will constitute settlement negotiations and any settlement proposal made pursuant to the conference will not be admissible as evidence of liability. In the event that the parties do not resolve their dispute pursuant to the dispute resolution conference, either party may commence legal action to resolve the dispute. Any such action must be commenced within six (6) months from the first day of the dispute resolution conference or be time barred. Submission of the dispute to the Director as outlined above

is a condition precedent to the right to commence legal action to resolve any dispute. In the event that either party commences legal action to adjudicate any dispute without first submitting the dispute to the Director, the other party will be entitled to obtain an order dismissing the litigation without prejudice and awarding such other party any costs and attorneys fees incurred by that party in obtaining the dismissal, including without limitation copy costs, and expert and consultant fees and expenses.

21. **Termination of Agreement by Contractor.** In the event Owner materially breaches any term of the Contract Documents, Contractor will promptly give Written Notice of the breach to Owner. If Owner fails to cure the breach within ten (10) days of the Written Notice, Contractor may terminate this Agreement by giving Written Notice to Owner and recover from Owner the percentage of the Contract Sum represented by the Work completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation or damages as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.
22. **Termination of Agreement by Owner for Cause.** Should Contractor make a general assignment for the benefit of its creditors, fail to apply enough properly skilled workmen or specified materials to properly prosecute the Work in accordance with Contractor's schedule, or otherwise materially breach any provision of the Contract Documents, then Owner may, without any prejudice to any other right or remedy, give Contractor Written Notice thereof. If Contractor fails to cure its default within ten (10) days, Owner may terminate this Agreement by giving Written Notice to Contractor, take possession of the premises and all materials, tools, and appliances thereon, and finish the Work by whatever method Owner deems expedient. In such case, Contractor will not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Sum exceeds the expense of finishing the Work, including compensation for additional administrative, architectural, consultant, and legal services (including without limitation attorneys fees, expert fees, copy costs, and other expenses), such excess will be paid to Contractor, less any offsets and recoupment. If such expense exceeds the unpaid balance, Contractor will pay the difference to Owner. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.
23. **Termination of Agreement by Owner for Convenience.** Notwithstanding any other provision contained in the Contract Documents, Owner may, without cause and in its absolute discretion, terminate this Agreement at any time. In the event of such termination, Contractor will be entitled to recover from Owner the percentage of the Contract Sum equal to the percentage of the Work which Owner and/or its architect determines has been completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets and recoupment. Contractor will not be entitled to unearned profits or any other compensation as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor. Without limitation, Contractor's indemnities and obligations as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.
24. **Assignment of Contract.** The parties hereto will not assign any rights or obligations under this Agreement without the prior written consent of the other party.
25. **Integration Clause.** The Contract Documents reflect the full agreement of the parties with respect to the Project and the Work and supersede all prior discussions, agreements, and representations regarding the subject matter of the Contract Documents. The Contract Documents may be amended only in a written document signed by both parties hereto.

26. **Applicable Law.** The parties acknowledge that the Contract Documents have substantial connections to the State of Utah. The Contract Documents will be deemed to have been made, executed, and delivered in Salt Lake City, Utah. To the maximum extent permitted by law, (i) the Contract Documents and all matters related to their creation and performance will be governed by and enforced in accordance with the laws of the State of Utah, excluding conflicts of law rules, and (ii) all disputes arising from or related to the Contract Documents will be decided only in a state or federal court located in Salt Lake City, Utah and not in any other court or state. Toward that end, the parties hereby consent to the jurisdiction of the state and federal courts located in Salt Lake City, Utah and waive any other venue to which they might be entitled by virtue of domicile, habitual residence, place of business, or otherwise.
27. **Enforcement.** In the event either party commences legal action to enforce or rescind any term of the Contract Documents, the prevailing party will be entitled to recover its attorneys fees and costs, including without limitation all copy costs and expert and consultant fees and expenses, incurred in that action and on all appeals, from the other party.
28. **Bid Proposal/Agreement.** Contractor's submission to Owner of this agreement signed by Contractor will constitute Contractor's offer and bid proposal to perform the Work described in this agreement according to the terms thereof. Owner's signing of this agreement and delivery to Contractor of a signed copy will constitute acceptance of Contractor's offer and will convert this document to a binding agreement.
29. **Effective Date.** The effective date of this Agreement is the date indicated by the Owner's signature.

OWNER:

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

Signature:

Print Name: Steven Smith

Title: Facility Manager

Address:

Sandy UT FM Group
625 East 8400 South, Suite A
Sandy, UT 84070-0525

Telephone No: 801.562.8138

Facsimile No:

Email: smithws@ldschurch.org

Effective Date:

Reviewed By:

CONTRACTOR:

(company)

Signature:

Print Name:

Title:

Address:

Telephone No:

Facsimile No:

Email:

Fed. I.D. or SSN:

License No:

Date Signed:

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EQUAL PRODUCT APPROVAL REQUEST FORM

Project Name: Midvalley 5,7 Request Number: _____

TO: _____

FROM: _____

BID DATE: _____

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

PROPOSED EQUAL PRODUCT:

Specification Section: _____

Specified Products: _____

Proposed Product: _____

The Undersigned certifies:

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

ATTACHMENTS:

Include the following attachments -

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

SIGNED: _____

Company _____

Address _____

City, State, Zip _____

Telephone _____ FAX _____

REVIEW COMMENTS:

_____ Accepted. See Addenda Number _____.

_____ Submission Not In Compliance With Instructions. Respond to attached comments and resubmit.

_____ Proposed Equal Product Not Acceptable. Use specified products.

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

ADDITIONAL COMMENTS:

BY: _____ **DATE:** _____

SUBCONTRACTORS AND MAJOR MATERIALS SUPPLIERS LIST

Project Name: Midvalley 5,7 Date: _____

Stake: Sandy UT Midvalley Stake Project No: 5135117

General Contractor: _____

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

VMR SUBCONTRACTORS

Roofing _____

Doors, Frames & Hardware _____

Storefronts _____

Wood Flooring _____

Other _____

Other _____

SUBCONTRACTORS AND SUPPLIERS

Grading / Site work _____

Site Utilities _____

Demolition _____

Paving _____

Termite Control _____

Site Concrete _____

Fencing _____

Irrigation System _____

Landscaping _____

Building Concrete _____

Masonry _____

Structural Steel _____

Framing _____

Trusses _____

Insulation _____

EIFS _____

Soffit / Fascia _____

Steeple _____

Millwork _____

Drywall _____

Ceramic Tile _____

Acoustical Tile _____

Painting _____

Wall Coverings _____

Elevators / Lifts _____

Draperies _____

Fire Sprinklers _____

Plumbing _____

HVAC _____

Electrical _____

Controls _____

Sound / Satellite _____

CONSTRUCTION MATERIAL ASBESTOS STATEMENT (U.S.)

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

Building Name: Midvalley 5,7

Building Plan Type: Cody Plan

Building Address: 1175 East 7800 South, Sandy, UT

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

Project Number: 5135117

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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SUPPLEMENTARY CONDITIONS

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

ITEM 1 - GENERAL

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

ITEM 2 - LIQUIDATED DAMAGES PAYABLE TO OWNER

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

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

ITEM 3 - PERMITS

Delete Item 9 in the Contractor's Bid Proposal and R & I Project Agreement (U.S.) and replace with the following:

9. The Owner will pay the costs of permits, 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 Bid Proposal and Project Agreement:

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

UTAH NOTICE OF INTENT TO OBTAIN FINAL COMPLETION:

Add the following to the Bid Proposal and Project Agreement:

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

UTAH NOTICE OF COMPLETION:

Add the following to the Bid Proposal and Project Agreement:

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

UTAH STATE PROGRESS PAYMENTS AND FINAL PAYMENT:

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

5. Payment

- a. If the Contractor's Bid Proposal Amount is over \$100,000.00, Contractor will submit to Owner a schedule of values which allocates the Contractor's Bid Proposal Amount to various portions of the Work. This schedule, when accepted by Owner, will be used as a basis for reviewing Contractor's payment requests.
- b. Progress Payments: Not more than once each month, Contractor will submit a payment request to Owner. Owner will pay Contractor progress payments for work completed within fifteen (15) days after Owner receives:
 1. Contractor's progress payment request for work to date;
 2. A certification by Contractor that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the current payment request; and
 3. Conditional Waiver and Release Upon Progress Payment documents submitted by Contractor (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's progress payment request.
- c. Final Payment: Owner will make full and final payment of the Contract Sum due within thirty

(30) days of the completion of all of the following requirements:

1. Contractor has submitted its final payment request;
2. Contractor has submitted a certification that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the final payment request; and
3. Contractor has submitted Waiver and Release Upon Final Payment documents (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's final payment request.

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

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

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

END OF DOCUMENT

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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 PRODUCT REQUIREMENTS**
- 01 6200 PRODUCT OPTIONS**
- 01 6400 OWNER-FURNISHED PRODUCTS**
- 01 6600 DELIVERY, STORAGE, AND HANDLING REQUIREMENTS**
- 01 7000 EXECUTION REQUIREMENTS**
- 01 7400 CLEANING AND WASTE MANAGEMENT**
- 01 7700 CLOSEOUT PROCEDURES**
- 01 7800 CLOSEOUT SUBMITTALS**

SECTION 01 1000 SUMMARY

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

SECTION 01 1200 MULTIPLE CONTRACT SUMMARY

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

SECTION 01 1400 WORK RESTRICTIONS

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

6. Refrain from using profanity or being discourteous or uncivil to others on Project Site or while performing The Work.
7. Wear shirts with sleeves, wear shoes, and refrain from wearing immodest, offensive, or obnoxious clothing, while on Project Site.
8. Do not allow playing of obnoxious and loud music on Project Site. Do not allow playing of any music within existing facilities.
9. Do not build fires on Project Site.
10. Do not allow weapons on Project Site, except those carried by law enforcement officers and/or other uniformed security personnel who have been retained by Owner or Contractor to provide security services.

B. Existing Facilities:

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

SECTION 01 3000 ADMINISTRATIVE REQUIREMENTS

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

SECTION 01 3100 PROJECT MANAGEMENT AND COORDINATION

A. Multiple Contract Coordination:

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

B. Preconstruction Conference:

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

SECTION 01 3300 SUBMITTAL PROCEDURES

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

2. Electronic Submittals:

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

2. Physical Submittals:

- a. 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.
- b. Package each submittal appropriately for transmittal and handling. On transmittal, record relevant information and requests for data.

SECTION 01 3500 SPECIAL PROCEDURES**A. Hot Work Permit (Available from Owner's Representative):**

1. Required for doing hot work involving open flames or producing heat or sparks such as:
 - a. Brazing.
 - b. Cutting.
 - c. Grinding.
 - d. Soldering.
 - e. Thawing pipe.
 - f. Torch applied roofing.
 - g. Welding.

SECTION 01 4000 QUALITY REQUIREMENTS

- A. Testing and inspecting services are used to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
- B. Conflicting Requirements: If compliance with two or more standards is specified and standards establish different or conflicting requirements for minimum quantities or quality levels, comply with most stringent requirement.
- C. Minimum Quantity or Quality Levels: Quantity or quality level shown or specified shall be the minimum provided or performed. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits.
- D. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to verify compliance and guard against defects and deficiencies and substantiate that proposed construction will comply with requirements. Owner or Owner's designated representative(s) will perform quality assurance to verify compliance with Contract Documents.
- E. Quality Control Services: Quality Control will be sole responsibility of Contractor. Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements performed by Contractor. They do not include inspections, tests or related actions performed by Architect or Owner Representative,

governing authorities or independent agencies hired by Owner or Architect. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor:

1. Where services are indicated as Contractor's responsibility, engage qualified Testing Agency to perform these quality control services:
 - a. Contractor will not employ same testing entity engaged by Owner, without Owner's written approval.
- F. Notify Owner immediately if asbestos-containing materials or other hazardous materials are encountered while performing the Work.
- G. Submit to Owner permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records establishing compliance with standards and regulations bearing upon performance of the Work.
- H. Repair And Protection:
 1. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 2. Protect construction exposed by or for Quality Assurance and Quality Control activities.
 3. Repair and protection are Contractor's responsibility, regardless of assignment of responsibility for Quality Assurance and Quality Control Services.

SECTION 01 4301 QUALITY ASSURANCE - QUALIFICATIONS

- A. Qualifications: Qualifications in this Section establish minimum qualification levels required; individual Specification Sections specify additional requirements:
 1. Fabricator / Supplier / Installer Qualifications:
 - a. Firm experienced in producing products similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units:
 - 1) Where heading '*VMR (Value Managed Relationship) Suppliers / Installers*' is used to identify list of specified suppliers or installers, Owner has established relationships that extend beyond requirements of this Project. No other suppliers / installers will be acceptable. Follow specified procedures to preserve relationships between Owner and specified suppliers / installers and advantages that accrue to Owner from those relationships.
 - 2) Where heading '*Acceptable or Approved Suppliers / Installers / Fabricators*' is used to identify list of specified suppliers / installers / fabricators, use only one of listed suppliers / installers / fabricators. No others will be acceptable.
 2. Factory-Authorized Service Representative Qualifications:
 - a. Authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
 3. Installer Qualifications:
 - a. Firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with record of successful in-service performance.
 4. Manufacturer Qualifications:
 - a. Firm experienced in manufacturing products or systems similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units.
 5. Manufacturer's Field Services Qualifications:
 - a. Experienced authorized representative of manufacturer to inspect field-assembled components and equipment installation, including service connections.
 6. Professional Engineer Qualifications:
 - a. Professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated:
 - 1) Engineering services are defined as those performed for installations of system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
 7. Specialists:
 - a. Certain sections of Specifications require that specific construction activities will be performed by entities who are recognized experts in those operations:

- 1) Specialists will satisfy qualification requirements indicated and will be engaged for activities indicated.
 - 2) Requirement for special will not supersede building codes and regulations governing the Work.
8. Testing Agency Qualifications:
- a. Independent Testing Agency with experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - b. Testing Laboratory:
 - 1) AASHTO Materials Reference Laboratory (AMRL) Accreditation Program.
 - 2) Cement and Concrete Reference Laboratory (CCRL).
 - 3) Nationally Recognized Testing Laboratory (NRTL): Nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 4) National Voluntary Laboratory (NVLAP): Testing Agency accredited according to National Institute of Standards and Technology (NIST) Technology Administration, U. S. Department of Commerce Accreditation Program.

SECTION 01 4523 TESTING AND INSPECTION SERVICES

- A. Submittals:
1. Certificates: Testing Agency will submit certified written report of each inspection, test, or similar service.
 2. Tests and Evaluation Reports:
 - a. Testing Agency or Agencies will prepare logs, test reports, and certificates applicable to specific tests and inspections and deliver copies to Owner's Representative and to each of following if involved on project: Architect, Consulting Engineers (Engineer of Record), General Contractor, Authorities Having Jurisdiction (if required).
 3. Testing Agency:
 - a. Qualifications of Testing Agency management, personnel, inspector and technicians designated to project.
 - b. Provide procedures for non-destructive testing, equipment calibration records, personnel training records, welding inspection, bolting inspection, shear connector stud inspection, and seismic connection inspections.
- B. Quality Assurance:
1. Owner or Owner's designated representative(s) will perform quality assurance. Owner's quality assurance procedures may include observations, inspections, testing, verification, monitoring and any other procedures deemed necessary by Owner to verify compliance with Contract Documents.
 2. Owner will employ independent Testing Agencies to perform certain specified testing, as Owner deems necessary.
 3. Certification:
 - a. Product producers and associations, which have instituted approved systems of quality control and which have been approved by document approval agencies, are not required to have further testing.
 - b. Concrete mixing plants, plants producing fabricated concrete and wood or plywood products certified by agency, lumber, plywood grade marked by approved associates, and materials or equipment bearing underwriters' laboratory labels require no further testing and inspection.
 4. Written Practice for Quality Assurance:
 - a. Testing Agency will maintain written practice for selection and administration of inspection personnel, describing training, experience, and examination requirements for qualification and certification of inspection personnel.
 - b. Written practice will describe testing agency procedures for determining acceptability of structure in accordance with applicable codes, standards, and specifications.
 - c. Written practice will describe Testing Agency inspection procedures, including general inspection, material controls, visual welding inspection, and bolting inspection.
- C. Quality Control:
1. Quality Control will be sole responsibility of Contractor. Contractor will be responsible for testing, coordination, start-up, operational checkout, and commissioning of all items of the Work included in Project. All costs for these services will be included in Contractor's cost of the Work.
 2. Notify results of all Testing and Inspection performed by Contractor's independent Testing Agencies to Architect and/or Owner's Representative within 24 hours of test or inspection having been performed:
 - a. Testing and Inspection Reports will be distributed as follows:
 - 1) 1 copy to Owner's Representative.

- 2) 1 copy to Architect.
 - 3) 1 copy to Consulting Engineer(s) (Engineer of Record).
 - 4) 1 copy to Authorities Having Jurisdiction (if required).
3. Contractor's Responsibility:
- a. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents.
 - b. Tests and inspections that are not explicitly assigned to Owner are responsibility of Contractor.
 - c. Cooperate with Testing Agency(s) performing required inspections, tests, and similar services and provide reasonable auxiliary services as requested. Notify Testing Agency before operations to allow assignment of personnel. Auxiliary services required include but are not limited to:
 - 1) Providing access to the Work and furnishing incidental labor, equipment, and facilities deemed necessary by Testing Agency to facilitate inspections and tests at no additional cost to Owner.
 - 2) Taking adequate quantities of representative samples of materials that require testing or helping Testing Agency in taking samples.
 - 3) Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
 - 4) Providing Testing Agency with preliminary design mix proposed for use for materials mixes that require control by Testing Agency.
 - d. For any requested inspection, Contractor will complete prior inspections to ensure that items are ready for inspection.
 - e. All Work is subject to testing and inspection and verification of correct operation.
 - f. Comply:
 - 1) Upon completion of Testing Agency's inspection, testing, sample-taking, and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes.
 - 2) Comply with Contract Documents in making such repairs.
 - g. Data:
 - 1) Furnish records, drawings, certificates, and similar data as may be required by testing and inspection personnel to assure compliance with Contract Documents.
 - h. Defective Work (Non-Conforming Work): Non-conforming Work as covered in General Conditions applies, but is not limited to following requirements Protection:
 - 1) Where results of inspections, tests, or similar services show that the Work does not comply with Contract Document requirements, correct deficiencies in the Work promptly to avoid work delays.
 - 2) Where testing personnel take cores or cut-outs to verify compliance, repair prior to acceptance.
 - 3) Contractor will be responsible for any and all costs incurred resulting from inspection that was scheduled prematurely or retesting due to failed tests.
 - 4) Remove and replace any Work found defective or not complying with contract document requirements at no additional cost to Owner.
 - 5) Should test return unacceptable results, Contractor will bear all costs of retesting and re-inspection as well as cost of all material consumed by testing, and replacement of unsatisfactory material and/or workmanship.
 - i. Protection:
 - 1) Protect construction exposed by or for quality assurance and quality control service activities, and protect repaired construction.
 - j. Scheduling: Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities:
 - 1) Schedule testing and inspections in advance so as not to delay the Work and to eliminate any need to uncover the Work for testing or inspection.
 - 2) Notify Testing Agency and Architect or Owner as noted in Sections in Division 01 thru Division 50 prior to any time required for such services.
 - 3) Incorporate adequate time for performance of all inspections and correction of noted deficiencies.
 - 4) Schedule sequence of activities to accommodate required services with minimum of delay.
 - 5) Schedule sequence of activities to avoid necessity of removing and replacing construction to accommodate testing and inspections.
 - k. Test and Inspection Log:
 - 1) Provide system of tracking all field reports, describing items noted, and resolution of each item. Prepare record of tests and inspections. Include following requirements:
 - (a) Date test or inspection was conducted.

- (b) Description of the Work tested or inspected.
 - (c) Date test or inspection results were transmitted to Architect or Owner Representative.
 - (d) Identification of Testing Agency or inspector conducting test or inspection.
 - 2) Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's or Owner's reference during normal working hours.
- D. Tests And Inspections - General:
- 1. Testing specifically identified to be conducted by Owner, will be performed by an independent entity and will be arranged and paid for by Owner.
 - 2. Individual Sections in Division 01 through Division 50 indicate if Owner will provide testing and inspection of the Work of that Section.
 - 3. Owner may engage additional consultants for testing, air balancing, commissioning, or other special services:
 - a. Activities of any such Owner consultants are in addition to Contractor testing of materials or systems necessary to prove that performance is in compliance with Contract requirements.
 - b. Contractor must cooperate with persons and firms engaged in these activities.
 - 4. Tests include but not limited to those described in detail in 'Field Quality Control' in Part 3 of Individual Sections in Divisions 01 through Division 50.
 - 5. Taking Specimens:
 - a. Only testing laboratory shall secure, handle, transport, or store any samples and specimens for testing.
 - 6. Scheduling Testing Agency:
 - a. Contractor will coordinate the Work and facilitate timeliness of such testing and inspecting services so as not to delay the Work.
 - b. Contractor will notify Testing Agency and Architect or Owner Representative to schedule tests and / or inspections.
- E. Testing Agency Services And Responsibility:
- 1. Testing Agency, including independent testing laboratories, will be licensed and authorized to operate in jurisdiction in which Project is located:
 - a. Approved Testing Agency Qualifications: Requirements of Section 01 4301 apply.
 - 2. Testing and Inspection Services:
 - a. Testing Agency will not release, revoke, alter, or increase Contract Document requirements or approve or accept any portion of the Work.
 - b. Testing Agency will not give direction or instruction to Contractor.
 - c. Testing Agency will have full authority to see that the Work is performed in strict accordance with requirements of Contract Documents and directions of Owner's Representative and/or Architect.
 - d. Testing Agency will not provide additional testing and inspection services beyond scope of the Work without prior approval of Owner's Representative and/or Architect.
 - 3. Testing Agency Duties:
 - a. Independent Testing Agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual specification Sections will cooperate with Architect or Owner Representative and Contractor in performance of its duties and will provide qualified personnel to perform required inspections and tests.
 - b. Testing Agency will test or obtain certificates of tests of materials and methods of construction, as described herein or elsewhere in technical specification.
 - c. Testing Agency will provide management, personnel, equipment, and services necessary to perform testing functions as outlined in this section.
 - d. Testing Agency must have experience and capability to conduct testing and inspecting indicated by ASTM standards and that specializes in types of tests and inspections to be performed.
 - e. Testing Agency will comply with requirements of ASTM E329, ASTM E543, ASTM C1021, ASTM C1077, ASTM C1093, ASTM D3666, ASTM D3740, and other relevant ASTM standards.
 - f. Testing Agency must calibrate all testing equipment at reasonable intervals (minimum yearly) with accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.
 - g. Welding Procedure Review: Testing Agency will provide review and approval or rejection of all welding procedures to be used and verify compliance with all reference standard requirements.
 - 4. Testing and Inspection Reports:
 - a. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
 - b. Laboratory Reports: Testing Agency will furnish reports of materials and construction as required, including:

- 1) Description of method of test.
- 2) Identification of sample and portion of the Work tested:
 - (a) Description of location in the Work of sample.
 - (b) Time and date when sample was obtained.
 - (c) Weather and climatic conditions at time when sample was obtained.
- 3) Evaluation of results of tests including recommendations for action.
- c. Inspection Reports:
 - 1) Testing Agency will furnish "Inspection at Site" reports for each site visit documenting activities, observations, and inspections.
 - 2) Include notation of weather and climatic conditions, time and date conditions and status of the Work, actions taken, and recommendations or evaluation of the Work.
- d. Reporting Testing and Inspection (Conforming Work):
 - 1) Submit testing and inspection reports as required within twenty four (24) hours of test or inspection having been performed.
- e. Reporting Testing and Inspection Defective Work (Non-Conforming Work):
 - 1) Testing Agency, upon determination of irregularities, deficiencies observed or test failure(s) observed in the Work during performance of its services of test or inspection having been performed, will:
 - (a) Verbally notify results to Architect, Contractor, and Owner's Representative within one hour of test or inspection having been performed (if Defective Work (Non-Conforming Work) is incorporated into project).
 - (b) Submit written inspection report and test results as required within twenty four (24) hours of test or inspection having been performed.
- f. Final Report:
 - 1) Submit final report of tests and inspections at Substantial Completion, which identify unresolved deficiencies.
- F. Architect's Responsibility:
 1. Architect Duties:
 - a. Notify Owner's Representative before each test and/or inspection:
- G. Field Quality Control:
 1. Field Tests And Inspections:
 - a. Field Test and Inspection requirements are described in detail in 'Field Quality Control' in Part 3 Execution' of individual Sections in Division 01 thru Division 49.

SECTION 01 5000 TEMPORARY FACILITIES AND CONTROLS

- A. Owner will provide electric power for construction activities within limits available at existing facility.
- B. Proprietary Camera Services: In its absolute discretion, and with or without notice to Contractor, Owner may provide from time to time, but is not obligated to provide, one or more cameras on or about Project site and/or signage or notices of the same:
 1. If provided by Owner, such camera(s) and/or signage and notices are solely for Owner's benefit and convenience and shall not be for benefit of Contractor, Subcontractor(s) or for any third person.
 2. Owner shall have no liability, obligation, or responsibility to Contractor, Subcontractors, or any third person relative to such camera(s), signage, or notices, or absence of camera(s), signage, or notices, including without limitation, installation, maintenance, operation, repair, testing, functionality, capacity, recording, monitoring, posting, etc., of the same (hereafter 'Proprietary Camera Services').
 3. Contractor, with Owner's prior consent (which shall not be unreasonably withheld), may relocate such camera(s), signage, or notices as necessary to not unreasonably, materially and physically interfere with work at Project Site.
 4. Contractor's obligations under Contract Documents, including but not limited to, Contractor's obligation for security of Project Site, are not modified by Owner's opportunity to provide, actually providing, or not providing Proprietary Camera Services and/or signage or notices regarding the same.
 5. This Specification Section does not preclude Contractor from providing its own camera(s), signage, or notices pursuant to terms and conditions of this Agreement. Neither does this Section reduce, expand or modify any other right or obligation of Owner pursuant to terms of this Agreement.
- C. Exercise caution to avoid fire damage: Do not build fires on site.
- D. Permanent mechanical system may be operated upon following conditions:

1. Do not interfere with normal set-back temperature patterns except as approved by Project Manager.
 2. Do not operate system when the Work causing airborne dust is occurring or when dust caused by such Work is present without first installing temporary filtering system.
- E. Existing lighting system may be used by Contractor.
- F. Contractor will use existing water supply for construction purposes to extent of existing facilities.
- G. Existing restroom facilities may be used by Contractor. Clean restrooms and portions of existing building used in accessing restrooms daily. If existing facilities are not usable, provide and maintain temporary sanitary toilet.
- H. Erect adequate barricades, warning signs, and lights necessary to protect persons from injury or harm.
- I. Contractor is responsible for security of materials, tools, and equipment. Do not permit others to use building keys provided by Owner. Safeguard building and contents while the Work is being performed and secure building when the Work is finished for day.
- J. Protect existing trees and plants. Remove and replace vegetation that dies or is damaged beyond repair due to construction activities.
- K. Provide temporary enclosures at exterior building openings for security and protection from weather, theft, and vandalism. Erect and maintain dust-proof partitions and enclosures as required to prevent spread of dust and fumes to occupied portions of building.
- L. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and reduce possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result:
1. Avoid use of tools and equipment that produce harmful noise.
 2. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near site.
 3. Protect the Work, materials, apparatus, and fixtures from injury due to weather, theft, and vandalism.

SECTION 01 6100 PRODUCT REQUIREMENTS

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

SECTION 01 6200 PRODUCT OPTIONS

- A. Product selection is governed by Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include:
1. Substitutions And Equal Products:
 - a. Generally speaking, substitutions for specified products and systems, as defined in Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
 - b. Approved Products / Manufacturers / Suppliers / Installers:
 - 1) Category One:
 - (a) Owner has established 'Value Managed Relationships' that extend beyond requirements of this Project. No substitutions or equal products will be allowed on this Project.
 - (b) Follow specified procedures to preserve relationships between Owner and specified manufacturers / suppliers and advantages that accrue to Owner from those relationships.
 - 2) Category Two:
 - (a) Owner has established National Contracts that contain provisions extending beyond requirements of this Project. No substitutions or equal products will be allowed on this Project.
 - (b) Follow specified procedures to preserve relationships between Owner and specified manufacturers / suppliers and advantages that accrue to Owner from those relationships.

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

SECTION 01 6400 OWNER-FURNISHED PRODUCTS

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

SECTION 01 6600 DELIVERY, STORAGE, AND HANDLING REQUIREMENTS

- A. Deliver, store, and handle products according to manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
- B. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
- C. Deliver products to site in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- D. Inspect products upon delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.
- E. Store products at site in manner that will simplify inspection and measurement of quantity or counting of units.
- F. Store heavy materials away from Project structure so supporting construction will not be endangered.
- G. Store products subject to damage by elements above ground, under cover in weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

SECTION 01 7000 EXECUTION REQUIREMENTS

- A. Design, furnish, and install all shoring, bracing, and sheathing as required for safety and for proper execution of the Work and, unless otherwise required, remove same when the Work is completed.

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

SECTION 01 7400 CLEANING AND WASTE MANAGEMENT

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

SECTION 01 7700 CLOSEOUT PROCEDURES

- A. General:
 - 1. Closeout process consists of three specific project closeout inspections. Contractor shall plan sufficient time in construction schedule to allow for required inspections before expiration of Contract Time.
 - 2. Contractor shall conduct his own inspections of The Work and shall not request closeout inspections until The Work of the contract is reasonably complete and correction of obvious defects or omissions are complete or imminent.

3. Date of Substantial Completion shall not occur until completion of construction work, unless agreed to by Architect / Owner's Representative and included on Certificate of Substantial Completion.
- B. Preliminary Closeout Review:
1. When Architect, Owner and Contractor agree that project is ready for closeout, Pre-Substantial Inspection shall be scheduled. Preparation of floor substrate to receive carpeting and any work which could conceivably damage or stain carpet must be completed, as carpet installation will be scheduled immediately following this inspection.
 2. Prior to this inspection, completed test and evaluation reports for HVAC system and font, where one occurs, are to be provided to Project Manager, Architect, and applicable consultants.
 3. Architect, Owner and Contractor review completion of punch list items. When Owner and Architect confirm that Contractor has achieved Substantial Completion of The Work, Owner, Architect and Contractor will execute Certificate of Substantial Completion that contains:
 - a. Punch list of items requiring completion and correction will be created.
 - b. Time frame for completion of punch list items will be established, and date for Substantial Completion Inspection shall be set.
- C. Substantial Completion Inspection:
1. When Architect, Owner and Contractor agree that project is ready for Substantial Completion, an inspection is held. Punch list created at Pre-Substantial Inspection is to be substantially complete.
 2. Prior to this inspection, Contractor shall discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups and similar elements.
 3. Architect, Owner and Contractor review completion of punch list items. When Owner and Architect confirm that Contractor has achieved Substantial Completion of The Work, Owner, Architect and Contractor will execute Certificate of Substantial Completion that contains:
 - a. Date of Substantial Completion.
 - b. Punch List Work not yet completed, including seasonal and long lead items.
 - c. Amount to be withheld for completion of Punch List Work.
 - d. Time period for completion of Punch List Work.
 - e. Amount of liquidated damages set forth in Supplementary Conditions to be assessed if Contractor fails to complete Punch List Work within time set forth in Certificate.
 4. Contractor shall present Closeout Submittals to Architect and place tools, spare parts, extra stock, and similar items required by Contract Documents in locations as directed by Facilities Manager.
- D. Final Acceptance Meeting:
1. When punch list items except for any seasonal items or long lead items which will not prohibit occupancy are completed, Final Acceptance Meeting is held.
 2. Owner, Architect and Contractor execute Owner's Project Closeout - Final Acceptance form, and verify:
 - a. All seasonal and long lead items not prohibiting occupancy, if any, are identified, with committed to completion date and amount to be withheld until completion.
 - b. Owner's maintenance personnel have been instructed on all system operation and maintenance as required by the Contract Documents.
 - c. Final cleaning requirements have been completed.
 3. If applicable, once any seasonal and long lead items are completed, Closeout Inspection is held where Owner and Architect verify that The Work has been satisfactorily completed, and Owner, Architect and Contractor execute Closeout portion of the Project Closeout - Final Acceptance form.
 4. When Owner and Architect confirm that The Work is satisfactorily completed, Architect will authorize final payment.

SECTION 01 7800 CLOSEOUT SUBMITTALS

- A. Operations And Maintenance Data: Operations And Maintenance Manual that include:
1. Project Manual:
 - a. Copy of complete Project Manual including Addenda, Modifications as defined in General Conditions, and other interpretations issued during construction:
 - (1) Mark these documents to show variations in actual Work performed in comparison with text of specifications and Modifications. Show substitutions, selection of options, and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.
 - (2) Note related record drawing information and Product Data.
 2. Soils Report:
 - a. Copy of Soils Report.
 3. Operations and Data:

- a. Operations and maintenance submittals required by Contract Documents.
 4. Warranty Documentation:
 - a. Copies of warranties required by Contract Documents.
 5. Record Documentation:
 - a. Certifications required by Contract Documents.
 - b. Documentation submittals required by Contract Documents.
 - c. Testing and Inspection Reports required by Contract Documents.
 6. Landscape Management Plan (LMP):
 - a. Irrigation Section:
 - (1) Documentation required by Sections under 32 8000 Heading: Irrigation.
 - b. Landscaping Section:
 - (1) Documentation required by Sections under 32 8000 Heading: Irrigation.
- B. Warranties:
1. When written guarantees beyond one (1) year after substantial completion are required by Contract Documents, secure such guarantees and warranties properly addressed and signed in favor of Owner. Include these documents in Operations & Maintenance Manual(s) specified above.
 2. Delivery of guarantees and warranties will not relieve Contractor from obligations assumed under other provisions of Contract Documents.
- C. Project Record Documents:
1. Do not use record documents for construction purposes:
 - a. Protect from deterioration and loss in secure, fire-resistive location.
 - b. Provide access to record documents for reference during normal Working hours.
 2. Maintain clean, undamaged set of Drawings. Mark set to show actual installation where installation varies from the Work as originally shown. Give particular attention to concealed elements that would be difficult to measure and record at later date.
 - a. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
 - b. Mark new information that is important to Owner, but was not shown on Contract Drawings.
 - c. Note related Change Order numbers where applicable.

END OF SECTION

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DIVISION 03: CONCRETE

03 1000 CONCRETE FORMING AND ACCESSORIES

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

03 2000 CONCRETE REINFORCING

03 2100 REINFORCEMENT BARS
03 2116 EPOXY-COATED REINFORCEMENT STEEL BARS

03 3000 CAST-IN-PLACE CONCRETE

03 3053 MISCELLANEOUS CAST-IN-PLACE CONCRETE
03 3111 NORMAL WEIGHT STRUCTURAL CONCRETE
03 3923 MEMBRANE CONCRETE CURING

03 6000 GROUTING

03 6213 NON-METALLIC NON-SHRINK GROUT
03 6300 EPOXY GROUTING

END OF TABLE OF CONTENTS

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SECTION 03 1113**STRUCTURAL CAST-IN-PLACE CONCRETE FORMING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Design, construction, and safety of formwork.
 - 2. Furnish and install required formwork ready for placing of concrete.
 - 3. Strip and dispose of formwork.
- B. Related Requirements:
 - 1. Section 01 0000: 'General Requirements':
 - a. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - b. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - 2. Section 03 3111: 'Normal Weight Structural Concrete'.
 - a. Tolerances for placing normal weight 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 318-11, 'Building Code Requirements for Structural Concrete and Commentary'.
 - 2. International Code Council (IBC):
 - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in pre-installation conference as specified in Section 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 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. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Printed application instructions for form release agents.

PART 2 - PRODUCTS

2.1 COMPONENTS

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

2.2 ACCESSORIES

- A. Form Release Agents:
 - 1. Unexposed Surfaces Only: Contractor's option.
- B. Expansion / 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. Provide temporary cleanouts at base of tall forms to facilitate cleaning and inspection.
 - 4. Make proper form adjustments before, during, and after concreting.
 - 5. 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.
 - 6. 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. Expansion Joints:
 - a. Install at joints between floor slab and foundation wall where shown on Drawings.
- C. Form Removal:
 - 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.

END OF SECTION

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SECTION 03 1511**CONCRETE ANCHORS AND INSERTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
1. Cast-in anchors for concrete.
 2. Headed concrete anchor studs for concrete.
 3. Deformed bar anchors for concrete.
 4. Adhesive anchors and inserts for concrete.
 5. Drilled-in mechanical anchors for concrete.
 6. Screw anchors for concrete.
 7. Concrete anchors and inserts not specified elsewhere.
- B. Related Requirements:
1. Section 01 0000: 'General Requirements':
 - a. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
 - a. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - b. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - c. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - d. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - e. Section 01 7800: 'Closeout Submittals'.
 2. Section 03 3111: 'Normal-Weight Structural Concrete' for installation of cast-in-place anchors and inserts.
 3. Section 06 1100: 'Wood Framing' for installation of drilled in anchors.

1.2 REFERENCES

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

- c. Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
 - d. Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.
 5. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform particular construction operation, including installation, erection, application, and similar operations.
 6. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
 7. Owner's Representative: Owner's Designated Representative (Project Manager or Facilities Manager) who will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.
 8. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
 9. Product Testing: Tests and inspections that are performed by testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
 10. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
 11. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
 12. Service Provider: Agency or firm qualified to perform required tests and inspections.
 13. Source Quality Control Testing: Tests and inspections that are performed at source, i.e., plant, mill, factory, or shop.
 14. Special Inspection: See Inspection.
 15. Special Inspector: Certified individual or firm that implements special inspection program for project.
 16. Special Test: See Test.
 17. Test/Special Test: Field or laboratory tests to determine characteristics and quality of building materials and workmanship.
 - a. Test: Not required by code provisions but may be required by Contract Documents.
 - b. Special Test: Required by code provisions and by Contract Documents.
 18. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
 19. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
 20. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.
- C. Reference Standards:
1. ASTM International:
 - a. ASTM A108-07, 'Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished'.
 - b. ASTM A307-10, 'Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength'.
 - c. ASTM A325-10, 'Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength'.
 - d. ASTM A490-12, 'Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength'.
 - e. ASTM A490M-12, 'Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints [Metric]'.
 - f. ASTM A496/A496M-07, 'Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement'.
 - g. ASTM A563-07a, 'Standard Specification for Carbon and Alloy Steel Nuts'.
 - h. ASTM A615/A615M-12, 'Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement'.

- i. ASTM A706/A706M-09b, 'Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement'.
 - j. ASTM C1077-11c, 'Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation'.
 - k. ASTM D3666-11, 'Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials'.
 - l. ASTM D3740-12a, 'Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction'.
 - m. ASTM E329-11a: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
 - n. ASTM E543-09, 'Standard Specification for Agencies Performing Nondestructive Testing'.
 - o. ASTM E1212-09, 'Standard Practice for Quality Management Systems for Nondestructive Testing Agencies'.
 - p. ASTM F1554-07ae1, 'Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength'.
2. International Code Council (IBC):
 - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.
 - b. ICC/ES AC193, 'Acceptance Criteria For Mechanical Anchors in Concrete Elements' (approved June 2012).
 - c. ICC/ES AC308 'Acceptance Criteria For Post-Installed Adhesive Anchors In Concrete Elements' (approved February 2012, compliance date July 2013).
 - d. ICC / ESR-1056, 'Titen HD Screw Anchors' (March 1, 2012).
 - e. ICC / ESR-3187, 'Hilti HIT HY 200 Max Adhesive Anchoring Systems' (January 1, 2012).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling:
 1. Inspection shall be performed according to Manufacturer's submitted ICC ES Evaluation Report.
 2. Notify Testing Agency and Architect one week before installing anchors so testing may be scheduled.

1.4 SUBMITTALS

- A. Action Submittals:
 1. Product Data:
 - a. Manufacturer's product literature for each item.
- B. Informational Submittals:
 1. Test And Evaluation Reports:
 - a. ICC ES Evaluation Report indicating conformance with current applicable ICC ES Acceptance Criteria.
 2. Manufacturer's Instructions:
 - a. Manufacturer's published installation recommendations for each item.

1.5 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 Drilled-In Mechanical Anchors / Adhesive Anchors / Screw Anchors and / or Headed Concrete Anchor Studs / Deformed Bar Anchors.

1.6 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 will provide Testing and Inspection for Drilled-In Mechanical Anchors / Adhesive Anchors / Screw Anchors and / or Headed Concrete Anchor Studs / Deformed Bar Anchors.
 - a. See Section 01 1200: 'Multiple Contract Summary'.

1.7 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.
 - 2. Threaded rod for adhesive anchors and cast-in anchors:
 - a. Conform to requirements of ASTM A307, Grade A or ASTM F1554.
 - 3. 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. Rebar:
 - a. Composed of deformed carbon steel meeting requirements of ASTM A706/A706M, Grade 60.
 - 5. Adhesive Anchors:
 - a. Cartridge Injection Adhesive Anchors.
 - b. Products shall have current ICC ES Evaluation report conforming to current ICC ES Acceptance Criteria AC308 for concrete.
 - c. Rod diameter and embedment length as indicated on Drawings.
 - d. Type Two Acceptable Products:
 - 1) HIT-HY200 Epoxy Adhesive by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
 - 2) PE1000+ 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. Drilled-In Mechanical Anchors (Expansion Bolts):
 - a. Products shall have current ICC ES Evaluation report conforming to current ICC ES 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) KWIK-HUS EZ-I Internally Threaded Screw Anchor by Hilti Fastening Systems, Tulsa, OK
www.us.hilti.com.
 - 3) HSL-3 Heavy Duty Expansion Anchor by Hilti Fastening Systems, Tulsa, OK
www.us.hilti.com.
 - 4) HDA Undercut Anchor by Hilti Fastening Systems, Tulsa, OK
www.us.hilti.com.
 - 5) Power-Stud +SD1 by Powers Fasteners Inc., Brewster NY
www.powers.com.
 - 6) Strong-Bolt by Simpson Strong-Tie Co., Pleasanton, CA
www.simpsonanchors.com.
 - 7) Equal as approved by Architect before installation. See Section 01 6200.
7. Screw Anchors:
 - a. Provide anchors with length identification markings conforming to ICC ES AC 193 for concrete.
 - b. Type Two Acceptable Products:
 - 1) Wedge-Bolt+ by Powers Fasteners Inc., Brewster NY
www.powers.com.
 - 2) Titen HD Screws by Simpson Strong Tie Co, Dublin, CA
www.strongtie.com.
 - 3) 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 concrete has achieved full design strength.

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. Drilled-In Anchors:
 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 Drawings, drill holes perpendicular to concrete surface.
 - c. Where anchors are to be installed in cored holes, use core bits with matched tolerances specified by Manufacturer. Cores 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:
 - 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.
 - 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. Drilled-in Mechanical Anchors (Expansion Bolts):
- a. Protect threads from damage during anchor installation.
 - b. Set anchors to Manufacturer's recommended torque, using a torque wrench. Following attainment of 10 percent of specified torque, 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 a torque wrench.

3.4 FIELD QUALITY CONTROL

A. Field Tests and Inspections:

1. Drill-In Mechanical 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 ACI 318 and applicable ASTM material standards. Periodic and continuous inspections include:
 - a) Inspection of bolts to be installed in concrete prior to and during placement of concrete (continuous).
 - b) Inspection of anchors installed in hardened concrete (periodic).
 - c. Testing:
 - 1) Ten percent (10%) 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 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.
 - a) Torque will be applied with calibrated torque wrench.

- b) 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.
- 2) Proof Load Table

DIRECT-PULL TENSION PROOF TEST LOADS TABLE FOR THREADED RODS ANCHORED WITH SIMPSON SET ADHESIVE SYSTEM IN 2000 PSI NORMAL WEIGHT CONCRETE OR 2000 PSI NORMAL WEIGHT MASONRY UNITS & GROUT COMPRESSIVE STRENGTH				
ROD DIAMETER, (INCH)	EMBEDDED DEPTH, (INCH)		PROOF LOAD, (LBS)	
	CONCRETE	MASONRY	CONCRETE	MASONRY
½" DIAMETER	4-1/4"	5"	2500 #	2500 #
5/8" DIAMETER	5"	5"	3000 #	3000 #
¾" DIAMETER	6-¾"	5"	3500 #	3500 #

- 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

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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 3100: 'Project Management and Coordination' for pre-installation conference.
 - c. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - d. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - e. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - f. Section 01 7800: 'Closeout Submittals'.
 2. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
 3. Section 03 3111: 'Normal Weight Structural Concrete'.
 - a. Reinforcement installed in concrete.
 - b. Pre-installation conference held jointly with other concrete related sections.

1.2 REFERENCES

- A. Association Publications:
1. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15th St., NW, Washington, DC 20005; 202-347-7474; www.acec.org).
- B. Definitions (Following are specifically referenced for testing):
1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
 2. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.
 3. Inspection/Special Inspection: Inspection of materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards:
 - a. Inspection: Not required by code provisions but may be required by Contract Documents.
 - b. Special Inspection: Required by code provisions and by Contract Documents.
 - c. Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
 - d. Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.
 4. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant

- construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
5. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
 6. Product Testing: Tests and inspections that are performed by testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
 7. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
 8. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
 9. Service Provider: Agency or firm qualified to perform required tests and inspections.
 10. Source Quality Control Testing: Tests and inspections that are performed at source, i.e., plant, mill, factory, or shop.
 11. Special Inspection: See Inspection.
 12. Special Inspector: Certified individual or firm that implements special inspection program for project.
 13. Special Test: See Test.
 14. Test/Special Test: Field or laboratory tests to determine characteristics and quality of building materials and workmanship.
 - a. Test: Not required by code provisions but may be required by Contract Documents.
 - b. Special Test: Required by code provisions and by Contract Documents.
 15. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
 16. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
 17. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.

C. Reference Standards:

1. American Concrete Institute:
 - a. ACI 117-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
 - b. ACI 117M-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary (Metric)'.
 - c. ACI 318-11, 'Building Code Requirements for Structural Concrete and Commentary'.
2. ASTM International (Following are specifically referenced for reinforcement bars testing):
 - a. ASTM A615/A615M-12, 'Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement'.
3. ASTM International (Following are specifically referenced for Testing Agencies):
 - a. ASTM E329-11c: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
 - b. ASTM E543-09, 'Standard Specification for Agencies Performing Nondestructive Testing'.
 - c. ASTM E1212-09, 'Standard Practice for Quality Management Systems for Nondestructive Testing Agencies'.

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 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. ACI 318, 'Building Code Requirements for Structural Concrete and Commentary'.
 - b. Concrete Reinforcing Steel Institute (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 will provide Testing and Inspection for inspection of reinforcement bars:
 - a. 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

USA PROJECTS: Include following paragraph.

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

2.2 ACCESSORIES

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

2.3 FABRICATION

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

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Avoid cutting or puncturing vapor retarder during reinforcement placement and concrete operations.
 - 2. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
 - 3. Blowtorch shall not be used to facilitate field cutting or bending or any other reinforcing work.
 - 4. Reinforcement shall not be bent after partially embedded in hardened concrete.
- B. Placing Reinforcement:
 - 1. Comply with Concrete Reinforcing Steel Institute (CRSI) 'Manual of Standard Practice' recommended practice for 'Placing Reinforcing Bars' for details and methods of reinforcement placement and supports. and as herein specified.
 - 2. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations:
 - a. Locate and support reinforcing by chairs, runners, bolsters, bar supports, spacers, or hangers, as required as recommended by 'ACI Detailing Manual, latest edition, 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 (1 350 mm) 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 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. 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) 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. Reinforcement Bars:
 - a. Testing Agency shall provide inspection for Reinforcement Bars. See Section 03 3111 for Testing and Inspection requirements.

END OF SECTION

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SECTION 03 2116**EPOXY - COATED REINFORCEMENT STEEL BARS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install epoxy coated reinforcement steel 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 3100: 'Project Management and Coordination' for pre-installation conference.
 - c. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - d. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - e. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - f. Section 01 7800: 'Closeout Submittals'.
 2. Section 03 0353: 'Miscellaneous Cast-In-Place Concrete'.
 3. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
 4. Section 03 2100: 'Reinforcement Bars'.
 5. Section 03 3111: 'Normal Weight Structural Concrete'.
 - a. Reinforcement installed in concrete.
 - b. Pre-installation conference held jointly with other concrete related sections.

1.2 REFERENCES

- A. Association Publications:
1. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15th St., NW, Washington, DC 20005; 202-347-7474; www.acec.org).
 2. Concrete Reinforcing Steel Institute (CRSI):
 - a. CRSI, 'Manual of Standard Practice' (2009 or latest edition available).
- B. Definitions (Following are specifically referenced for testing):
1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
 2. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.
 3. Inspection/Special Inspection: Inspection of materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards:
 - a. Inspection: Not required by code provisions but may be required by Contract Documents.
 - b. Special Inspection: Required by code provisions and by Contract Documents.
 - c. Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
 - d. Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.

4. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
5. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
6. Product Testing: Tests and inspections that are performed by testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
7. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
8. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
9. Service Provider: Agency or firm qualified to perform required tests and inspections.
10. Source Quality Control Testing: Tests and inspections that are performed at source, i.e., plant, mill, factory, or shop.
11. Special Inspection: See Inspection.
12. Special Inspector: Certified individual or firm that implements special inspection program for project.
13. Special Test: See Test.
14. Test/Special Test: Field or laboratory tests to determine characteristics and quality of building materials and workmanship.
 - a. Test: Not required by code provisions but may be required by Contract Documents.
 - b. Special Test: Required by code provisions and by Contract Documents.
15. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
16. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
17. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.

C. Reference Standards:

1. American Concrete Institute:
 - a. ACI 117-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
 - b. ACI 117M-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary (Metric)'.
 - c. ACI 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-14, 'Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement'.
 - b. ASTM A706/A706M-14, 'Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement'.
 - c. ASTM A775/A775M-07b(2014), 'Standard Specification for Epoxy-Coated Reinforcing Bars'.
3. ASTM International (Following are specifically referenced for Testing Agencies):
 - a. ASTM E329-14a: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
 - b. ASTM E543-13, 'Standard Specification for Agencies Performing Nondestructive Testing'.
 - c. ASTM E1212-12, 'Standard Practice for Quality Management Systems for Nondestructive Testing Agencies'.
4. International Code Council (IBC):
 - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.

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 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 certifying mill tests for reinforcing in accordance with ASTM A775.
 - 1) Mill test is to be approved before fabrication begins.
- 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. ACI 318, 'Building Code Requirements for Structural Concrete and Commentary'.
 - b. Concrete Reinforcing Steel Institute (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 will provide Testing and Inspection for inspection of reinforcement bars:
 - a. Owner will employ testing agencies to perform 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'.
 - b. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control.
 - 1) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Deliver bars separated by size and tagged with manufacturer's heat or test identification number.
 - 2. Reinforcement steel bars shall be free of abrasions or other penetrations of epoxy-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. Epoxy Coated Reinforcement Steel Bars:
 - 1. Bars shall have grade identification marks and conform to ASTM A615/A615M with coating conforming to ASTM A775/A775M and comply with requirements of ACI 318.21.2.5.
 - a. Bar supports shall be completely coated with epoxy or vinyl, compatible with both concrete and epoxy coating on bars. Coating shall be at least 1/8 inch thick at tips.
 - b. Tie wire shall be nylon coated.
 - 2. Actual yield strength based on mill tests does not exceed specified yield strength by more than 18,000 psi and Ratio of actual ultimate stress (at breaking point) to actual tensile yield stress shall not be less than 1.25.
 - a. Grade 60 minimum, except dowels that are to be field bent, Grade 40 minimum.
 - 3. Bars shall be deformed type.
 - 4. Bars shall be free of heavy rust scales and flakes, or other bond-reducing coatings.

2.2 ACCESSORIES

- A. Bar Supports:
 - 1. Concrete masonry units or bricks are not acceptable.
 - 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).
 - 3. Type Two Acceptable Products:
 - a. Concrete 'dobies' or blocks wired to reinforcing.
 - b. Manufactured chairs with 4 sq inch (25.8 sq cm) bearing surface with 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. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

2. Blowtorch shall not be used to facilitate field cutting or bending or any other reinforcing work.
3. 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, latest edition, 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 (1 350 mm)** 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 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. 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) Exterior Slabs on Grade (where shown): **2 inches (50 mm)**.
 - 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. General:
 - a. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - b. Quality Control is sole responsibility of Contractor as specified in Section 01 4523 'Testing And Inspection Services'.
2. 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 3053**MISCELLANEOUS EXTERIOR CAST-IN-PLACE CONCRETE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Compact aggregate base for miscellaneous cast-in-place concrete as described in Contract Documents.
 2. Furnish and install miscellaneous cast-in-place concrete and equipment pads as described in Contract Documents.
 3. Furnish and install sealants and curing compounds as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
1. Pipe bollards.
- C. Related Requirements:
1. Section 01 0000: 'General Requirements':
 - a. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
 - b. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - c. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - d. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - e. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - f. Section 01 7800: 'Closeout Submittals'.
 2. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
 3. Section 03 3111: 'Normal Weight Structural Concrete' for:
 - a. Concrete mix information and use admixtures.
 - b. Field Quality Control Testing and Inspection requirements for concrete.
 - c. Pre-installation conference held jointly with other concrete related sections.
 4. Section 03 3923: 'Membrane Concrete Curing' for application.
 5. Section 05 1223: 'Structural Steel For Buildings' for :
 - a. Furnishing of pipe for pipe bollards.
 6. Section 07 9213: 'Elastomeric Joint Sealant' for quality of sealants.
 7. Section 31 0501: 'Common Earthwork Requirements' for:
 - a. General procedures and requirements for earthwork.
 - b. Pre-installation conference held jointly with other common earthwork related sections.
 8. Section 31 1123: 'Aggregate Base' for installation of aggregate base.
 9. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
 10. Section 31 2323: 'Fill' for compaction procedures and tolerances.

1.2 REFERENCES

- A. Association Publications:
1. American Concrete Institute, Farmington Hills, MI www.concrete.org. Abstracts of ACI Periodicals and Publications.
 - a. ACI 224R-01, '*Control of Cracking in Concrete Structures*' (Reapproved 2008).
 - b. ACI 224.1R-07, '*Causes, Evaluation, and Repair of Cracks in Concrete Structures*' (March 1, 2007).
 - c. ACI 224.2R-92: '*Cracking of Concrete Members in Direct Tension*' (Reapproved 2004).

- d. ACI 224.3R-95, 'Joints in Concrete Construction' (Reapproved 2008).
 - e. ACI 302.1R-04: 'Guide for Concrete Floor and Slab Construction' (March 23, 2004).
 - f. ACI 305R-10, 'Guide to Hot Weather Concreting'.
 - g. ACI 306R-10, 'Guide to Cold Weather Concreting'.
2. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15th St., NW, Washington, DC 20005; 202-347-7474; www.acec.org).

B. Definitions:

1. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.

C. Reference Standards:

1. American Concrete Institute:
 - a. ACI 117-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
 - b. ACI 117M-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary (Metric)'.
 - c. ACI 301-10, 'Specification for Structural Concrete'.
 - d. ACI 305.1-06, 'Specification for Hot Weather Concreting'.
 - e. ACI 306.1-90(R2002), 'Standard Specification for Cold Weather Concreting'.
 - f. ACI 318-11, 'Building Code Requirements for Structural Concrete and Commentary'.
2. ASTM International:
 - a. ASTM D1751-04(2008), 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)'.
 - b. ASTM E329-11c: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
3. International Code Council (IBC):
 - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:

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

B. Scheduling:

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

1.4 SUBMITTALS

- A. Action Submittals:
 1. Joint layout plan for control and expansion joints for sidewalks, curbs, and gutters for written approval before starting work on this Section.
 2. Detectable warning panels:
 - a. Layout plan and joints location for written approval before starting work on this Section.
- B. Closeout Submittals:
 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Testing and Inspection Reports:
 - a) Testing Agency Testing and Inspecting Reports of concrete for exterior site work.

1.5 QUALITY ASSURANCE

- A. Testing and Inspection.
 1. Owner will provide Testing and Inspection for concrete for exterior site work:
 - a. See Section 01 1200: 'Multiple Contract Summary'.

1.6 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 SYSTEM

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

2.2 ACCESSORIES

- A. Formwork:
 1. Meet requirements specified in Section 03 1113.
- B. Expansion Joint Material:
 1. **1/2 inch (12.7 mm)** thick.
 2. Manufactured commercial fiber type:
 - a. Meet requirements of ASTM D1751.
 - b. Type Two Acceptable Products:
 - 1) Conflex by Knight-Celotex, Northfield, IL www.aknightcompany.com.
 - 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.
- C. Finishing Material:
1. Finishing Material available in multiple concrete shades to closely match concrete surface.
 2. Type Two Acceptable Products:
 - a. Mixture of 1 part cement (using same cement as used in concrete foundations), 1 part sand with 95% passing #50 sieve.
 - b. RapidSet WunderFixx by CTS Cement Manufacturing Corporation, Cypress, CA www.rapidset.com.
 - 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. Surface Preparation:
1. Aggregate base and subgrade:
 - a. Prepare aggregate base as specified in Section 31 1123.
 - b. Prepare natural soil subgrade as specified in Section 31 2213.
 - c. Prepare fill subgrade as specified in Section 31 2323.
- B. Concrete Slab Thickness:
1. Increase thickness of concrete beneath detectable warning panels **one inch (25 mm)**.

3.3 INSTALLATION

- A. General:
1. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree into landscaped areas.
- B. Sidewalks, 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. Do not dust with cement.

4. Concrete walks shall be screeded to bring surface to grades and lines as indicated. Surface shall be floated with wood float with no coarse aggregate showing and then given broom finish before concrete sets.
- C. Mow Strips and Aprons:
1. 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: **3 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.
- D. Light Pole Bases, Mow Strips, and Aprons:
1. Install bond breaker consisting of three 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.
- E. Pipe Bollards:
1. Install plumb and fill with concrete.
- F. 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.
- G. Joints:
1. Control Joints:
 - a. Control joints in Concrete Paving are specified in Section 32 1313.
 - b. Depth of control joints shall be approximately one quarter of concrete slab thickness, but not less than **one inch (25 mm)**.
 - c. Control joints to be hand tooled in sidewalks, curbs and gutters, mow strips, and aprons.
 - d. Spacing On Center (+/-):

Sidewalks	4 feet to 6 feet	12 meters to 18 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	

2. Expansion Joints:
 - a. Expansion joints in Concrete Paving are specified in Section 32 1313.
 - b. Install so top of expansion joint material is **1/4 inch (6 mm)** below finished surface of concrete.
 - c. No expansion joint required between curbs and sidewalks parallel to curb.
 - d. 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).
 - e. Provide expansion joints between sidewalks that are parallel, and adjacent, to the storage building or main building.
 - f. 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.
 - g. Spacing On Center (+/-):

Sidewalks, Curbs and Gutters	40 feet to 100 feet	12 meters to 30 meters
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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

- h. Seal expansion joints as specified in Section 07 9213 for following areas:
- 1) Between entryway slabs and building foundations.
 - 2) Between sidewalks and building foundations.
 - 3) Concrete retaining walls.
 - 4) Within curbs and gutters.
 - 5) Within flat drainage structures and at joints between flat drainage structures and other concrete elements.
- i. Expansion joints are not required to be sealed for following areas:
- 1) Within aprons and where apron abuts sidewalks.
 - 2) Within mow strips and where mow strip abuts building foundation and sidewalks.
 - 3) Within sidewalks.
- H. Finish:
1. Flatwork:
 - a. Curb, Gutter Sidewalks, Mow Strips, Flat Drainage Structures, Stairs, And Miscellaneous:
 - 1) After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
 - a) Provide fine hair finish where grades are less than 6 percent 1-1/4 inch (32 mm).
 - b) Provide rough hair finish where grades exceed 6 percent 1-1/4 inch (32 mm).
 - c) Broom finish, by drawing broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide fine line texture acceptable to Architect. At curb and gutter, apply broom finish longitudinal to curb and gutter flowline.
 - d) On inclined slab surfaces, provide coarse, non-slip finish by scoring surface with stiff-bristled broom, perpendicular to line of traffic. At curb and gutter, apply broom finish longitudinal to curb and gutter flowline.
 - e) Do not remove forms for twenty four (24) hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.
 - f) Round edges exposed to public view to 1/2 inch (13 mm) radius, including edges formed by expansion joints.
 - g) Remove edger marks.
 - b. Concrete Paving Finish is specified in Section 32 1313.
 2. Vertical Surfaces (Exposed To View Vertical Surfaces, Exposed Retaining Walls, Exposed Foundation Walls, Concrete Piers, and etc.):
 - a. General:
 - 1) Finishing Material to fill and smooth interior and exterior concrete surface defects such as spalls, gouges, cracks, dents, chips, bug holes, stone pockets, honeycombs, voids and other defective areas.
 - 2) Chamfer lines shall be finished.
 - b. Surface Preparation:
 - 1) Formwork shall be stripped from concrete while concrete is still "green".
 - 2) Concrete surface to be finished immediately after formwork has been removed.
 - a) Immediately after removing forms, remove joints, marks, bellies, projections, loose materials and other irregularities, and cut back metal ties from surfaces to be exposed.
 - b) Repair defective areas and voids or stone pockets with Finishing Material and smooth to even surface matching surrounding undamaged area.
 - c. Smooth Rubbed Finish:
 - 1) Thoroughly wet with water, apply Finishing Material in thin layer, rub in circular motion to smooth uniform finish.
 - 2) Entire surface shall be protected from rapid drying for not less than three (3) days.
 - 3) Surfaces shall be cleaned of drip marks and discolorations.

- 4) Concrete surface shall be left with clean, neat, uniform finish, free from form markings and shall be uniform in color and texture.
3. Light Pole Bases:
 - a. Exposed portion to have smooth rubbed finish as specified in Vertical Surfaces in previous paragraph.

3.4 APPLICATION

- A. Interface With Other Work:
 1. Membrane Curing Compound:
 - a. Apply product specified in Section 03 3923 to curbs, gutters, sidewalks, flat drainage structures, stairs, landings, and pads.

3.5 FIELD QUALITY CONTROL

- A. Field Tests and Inspections:
 1. Concrete:
 - a. Testing Agency shall provide testing and inspection for Miscellaneous Exterior Concrete. See Section 03 3111 for Testing and Inspection requirements.
- B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
 1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.

3.6 CLEANING

- A. General:
 1. Detectable Warning Panels:
 - a. Clean the panel in accordance with Manufacturer's cleaning instructions.

3.7 PROTECTION

- A. General:
 1. Protect concrete that has not received its initial set from precipitation to avoid excess water in mix and unsatisfactory surface finish.
- B. 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 3111**NORMAL WEIGHT STRUCTURAL CONCRETE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install Project concrete work as described in Contract Documents.
 2. Quality of concrete used on Project but furnished under other Sections.
- B. Products Installed But Not Furnished Under This Section:
1. Inserts, bolts, boxes, templates, and fastening devices for other work, including those for bases only for Mechanical and Electrical.
 2. Concrete accessories.
- C. Related Requirements:
1. Pre-installation conference held jointly with Section 31 3111 as described in Administrative Requirements on Part 1 of this specification section.
 2. Section 01 0000: 'General Requirements':
 - a. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
 - b. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - c. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - d. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - e. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - f. Section 01 7800: 'Closeout Submittals'.
 3. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
 4. Section 03 1511: 'Concrete Anchors and Inserts'.
 5. Section 03 2100: 'Reinforcement Bars'.
 6. Section 03 3923: 'Membrane Concrete Curing' for application.
 7. Division 26: electrical devices including boxes, conduits, pipes, hangers, inserts, and other work to be embedded in concrete work before placing.
 8. Section 31 1123: 'Aggregate Base' for aggregate base under miscellaneous cast-in-place concrete and exterior slabs, under interior slabs-on-grade concrete, and asphalt paving.
 9. Section 31 2213: 'Rough Grading' for grading and preparation of natural soil subgrades below fill and aggregate base materials.
 10. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
 11. Section 31 2323: 'Fill' for compaction procedures and tolerances.
 12. Furnishing of items to be embedded in concrete specified in Section involved.

1.2 REFERENCES

- A. Association Publications:
1. American Concrete Institute, Farmington Hills, MI www.concrete.org. Abstracts of ACI Periodicals and Publications.
 - a. ACI 214.3R-88(97), *'Recommended Practice for Evaluation of Strength Test Results of Concrete'*.
 - b. ACI 224R-01, *'Control of Cracking in Concrete Structures'* (Reapproved 2008).
 - c. ACI 224.1R-07, *'Causes, Evaluation, and Repair of Cracks in Concrete Structures'* (March 1, 2007).
 - d. ACI 224.2R-92: *'Cracking of Concrete Members in Direct Tension'* (Reapproved 2004).

- e. ACI 224.3R-95, *Joints in Concrete Construction*' (Reapproved 2008).
 - f. ACI 302.1R-04: *Guide for Concrete Floor and Slab Construction*' (March 23, 2004).
 - g. ACI 302.2R-06, *'Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials*' (August 15, 2006).
 - h. ACI 304R.6R-09, *'Guide for the Measure of Volumetric-Measuring & Continuous-Mixing Concrete Equipment*'.
 - i. ACI 305R-10, *'Guide to Hot Weather Concreting*'.
 - j. ACI 306R-10, *'Guide to Cold Weather Concreting*'.
 - k. ACI 309.1R-08, *'Report on Behavior of Fresh Concrete During Vibration*'.
 - l. ACI 311.4R-05, *'Guide for Concrete Inspection*'.
 - m. ACI 347-04, *'Guide to Formwork for Concrete*'.
 - n. ACI CP-1-12, *'Technical Workbook for ACI Certification of Concrete Field Testing Technician – Grade 1'*.
 - o. ACI Flatwork Finisher Certification Program.
 - p. ACI Field Technician Certification Program.
 - q. SP-204-01, *'Design and Construction Practices to Mitigate Cracking*'.
 - r. SP-231R-10, *'Report on Early-Age Cracking: Causes, Measurement and Mitigation*'.
2. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15th St., NW, Washington, DC 20005; 202-347-7474; www.acec.org).
 3. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15th St., NW, Washington, DC 20005; 202-347-7474; www.acec.org).

B. Definitions (Following are specifically referenced for testing):

1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
2. Approved: To authorize, endorse, validate, confirm, or agree to.
3. Cementitious Materials: Portland cement alone or in combination with one or more of following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
4. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.
5. Floor Flatness (FF): Rate of change in elevation of floor over a **12 inches (305 mm)** section.
6. Floor Levelness (FL): Measures difference in elevation between two points which are **10 feet (3.05 m)** apart.
7. Inspection/Special Inspection: Inspection of materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards:
 - a. Inspection: Not required by code provisions but may be required by Contract Documents.
 - b. Special Inspection: Required by code provisions and by Contract Documents.
 - c. Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
 - d. Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.
8. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform particular construction operation, including installation, erection, application, and similar operations.
9. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation. They are not samples. Approved mockups establish standard by which the Work will be judged.
10. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.

11. Owner's Representative: Owner's Designated Representative (Project Manager or Facilities Manager) who will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.
12. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
13. Product Testing: Tests and inspections that are performed by testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
14. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
15. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
16. Service Provider: Agency or firm qualified to perform required tests and inspections.
17. Source Quality Control Testing: Tests and inspections that are performed at source, i.e., plant, mill, factory, or shop.
18. Special Inspection: See Inspection.
19. Special Inspector: Certified individual or firm that implements special inspection program for project.
20. Special Test: See Test.
21. Test/Special Test: Field or laboratory tests to determine characteristics and quality of building materials and workmanship.
 - a. Test: Not required by code provisions but may be required by Contract Documents.
 - b. Special Test: Required by code provisions and by Contract Documents.
22. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
23. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
24. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.

C. Reference Standards:

1. American Association of State and Highway Transportation Officials:
 - a. AASHTO M 153-06, 'Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction'.
 - b. AASHTO T 318-02, 'Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying'.
2. American Concrete Institute:
 - a. ACI 117-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
 - b. ACI 211.1-91(R2009), 'Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete'.
 - c. ACI 301-10, 'Specification for Structural Concrete'.
 - d. ACI 318-08, 'Building Code Requirements for Structural Concrete and Commentary'.
3. ASTM International:
 - a. ASTM A615/A615M-12, 'Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement'.
 - b. ASTM A706/A706M-09b, 'Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement'.
 - c. ASTM C31/C31M-10, 'Standard Practice for Making and Curing Concrete Test Specimens in the Field'.
 - d. ASTM C33/C33M-11a, 'Standard Specification for Concrete Aggregates'.
 - e. ASTM C39/C39M-12, 'Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens'.
 - f. ASTM C42/C42M-12, 'Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete'.
 - g. ASTM C94/C94M-12, 'Standard Specification for Ready-Mixed Concrete'.
 - h. ASTM C138/C138M-12a, 'Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete'.
 - i. ASTM C140-12, 'Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units'.

- j. ASTM C143/C143M-10a, 'Standard Test Method for Slump of Hydraulic-Cement Concrete'.
 - k. ASTM C150/C150M-12, 'Standard Specification for Portland Cement'.
 - l. ASTM C171-07, 'Standard Specification for Sheet Materials for Curing Concrete'.
 - m. ASTM C172/C172M-10, 'Standard Practice for Sampling Freshly Mixed Concrete'.
 - n. ASTM C173/C173M-10b, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method'.
 - o. ASTM C192/C192M-07, 'Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory'.
 - p. ASTM C231/C231M-10, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method'.
 - q. ASTM C260/C260M-10a, 'Standard Specification for Air-Entraining Admixtures for Concrete'.
 - r. ASTM C330/C330M-09, 'Standard Specification for Lightweight Aggregates for Structural Concrete'.
 - s. ASTM C494/C494M-11, 'Standard Specification for Chemical Admixtures for Concrete'.
 - t. ASTM C496/C496M-11, 'Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens'.
 - u. ASTM C567/C567M-11, 'Standard Test Method for Determining Density of Structural Lightweight Concrete'.
 - v. ASTM C595/C595M-12, 'Standard Specification for Blended Hydraulic Cements'.
 - w. ASTM C597-09, 'Standard Test Method for Pulse Velocity Through Concrete'.
 - x. ASTM C618-12, 'Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete'.
 - y. ASTM C803/C803M-03(2010), 'Standard Test Method for Penetration Resistance of Hardened Concrete'.
 - z. ASTM C805/C805M-08, 'Standard Test Method for Rebound Number of Hardened Concrete'.
 - aa. ASTM C989/C989M-11, 'Standard Specification for Slag Cement for use in Concrete and Mortars'.
 - bb. ASTM C1077-11c, 'Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation'.
 - cc. ASTM C1157/C1157M-11, 'Standard Performance Specification for Hydraulic Cement'.
 - dd. ASTM C1688/C1688M-12, 'Standard Test Method for Density and Void Content of Freshly Mixed Pervious Concrete'.
 - ee. ASTM D1752-04a(2008), 'Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction'.
 - ff. ASTM D3666-11, 'Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials'.
 - gg. ASTM E329-11c: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
 - hh. ASTM E543-09, 'Standard Specification for Agencies Performing Nondestructive Testing'.
 - ii. ASTM E1155-96(2008), 'Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers'.
 - jj. ASTM E1212-09, 'Standard Practice for Quality Management Systems for Nondestructive Testing Agencies'.
 - kk. ASTM F710-11, 'Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring'.
 - ll. ASTM F2170-11, 'Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes'.
4. International Code Council (IBC):
- a. IBC Chapter 17, 'Structural Tests and Special Inspections'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in pre-installation conference as specified in Section 01 3100 and held jointly with following sections:
 - a. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
 - b. Section 03 2100: 'Reinforcement Bars'.

- c. Section 03 3053: 'Miscellaneous Exterior Cast-In-Place Concrete'.
Section 26 0526: 'Grounding And Bonding For Electrical Systems'.
2. Schedule pre-installation conference prior to placing of footings, installation of foundation forms and reinforcing steel, and installation of anchors, dowels, inserts, and block outs in foundation walls and slabs:
3. In addition to agenda items specified in Section 01 3100, review following:
 - a. Installation scheduling, coordination, placement of concrete, and placement of items installed in and under floor slab.
 - b. Review requirements for preparation of subgrade.
 - c. Review aggregate base requirements.
 - d. Review formwork requirements.
 - e. Review approved mix design requirements and use of admixtures.
 - f. Review reinforcing steel submittals.
 - g. Review placement, finishing, and curing of concrete including cold and hot weather requirements.
 - h. Review jointing requirements and joint layout.
 - i. Review concrete slab tolerances and corrective measures if tolerances not met.
 - j. Review safety issues.
 - k. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
 - 1) Review frequency of testing and inspections.

B. Scheduling:

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

1.4 SUBMITTALS

A. Action Submittals:

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

B. Informational Submittals:

1. Certificates:
 - a. Installers:
 - 1) Certification for National Ready Mixed Concrete Association (NRMCA).
 - 2) Certification for ACI-certified Flatwork Finishers and Technicians.
2. Design Data:
 - a. Mix Design:
 - 1) Furnish proposed mix design to Architect for review prior to commencement of Work.
 - a) Include density (unit weight) and void content determined per ASTM C1688/C1688M for fresh mixed properties and per ASTM C140 for hardened concrete properties.
 - b) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use.
 - b. Ready-Mix Supplier:
 - 1) Require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job-site for use of Owner or his representatives. Tickets shall show following:
 - a) Name of ready-mix batch plant.
 - b) Serial number of ticket.
 - c) Date and truck number.
 - d) Name of Contractor.
 - e) Name and location of Project.

- f) Specific class or designation of concrete conforming to that used in Contract Documents.
 - g) Amount of concrete.
 - h) Amount and type of cement.
 - i) Total water content allowed by mix design.
 - j) Amount of water added at plant.
 - k) Sizes and weights of sand and aggregate.
 - l) Time loaded.
 - m) Type, name, manufacturer, and amount of admixtures used.
 - n) Design Data.
- 2) Provide certificates with supporting testing reports verifying compliance with Contract Document requirements and that materials provided are from single source for following:
- a) Cement.
 - b) Aggregate.
 - c) Fly Ash.
3. Source Quality Control Submittals:
- a. Concrete mix design: Submit mix designs to meet following requirements:
 - 1) Proportions:
 - a) Mix Type A:
 - (1) 3000 psi (20.68 MPa) minimum at twenty eight (28) days.
 - (2) Water / Cement Ratio: 0.45 to 0.50 by weight.
 - b) Mix Type D (also to be used for exterior concrete subject to freeze thaw conditions and de-icers):
 - (1) 4500 psi (31.03 MPa) minimum at twenty eight (28) days.
 - (2) Water / Cement Ratio: 0.45 maximum by weight (water/cement ratio shall not exceed 0.45 for exterior concrete flatwork (sidewalks, curb and gutter, concrete paving, etc.)).
 - 2) Slump:
 - a) 4 inch (100 mm) slump maximum before addition of high range water reducer.
 - b) 8 inch (200 mm) slump maximum with use of high range water reducer.
 - c) Slump not required for Mix Type F.
 - 3) Admixtures:
 - a) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use. Do not use any admixture without Architect's written approval.
 - b) Mineral: An amount of specified Class F (or Class C where Class F is not available) fly ash not to exceed twenty (20) percent of weight of cement may be substituted for cement. If substituted, consider fly ash with cement in determining amount of water necessary to provide specified water / cement ratio.
 - c) Chemical: Specified accelerator or retarder may be used if necessary to meet environmental conditions.
- C. Closeout Submittals:
- 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Pour Reports:
 - a) Provide report that records following information:
 - b) Date and time of start of pour, Date and time of end of pour, and Date and time of end of finishing procedures.
 - c) Temperature at start of pour, Temperature at end of Pour, and Maximum temperature during performance of finishing procedures.
 - d) Wind speed at start of pour, Wind speed at end of pour, and Maximum wind speed during performance of finishing procedures.
 - e) Humidity at start of pour, Humidity at end of pour, and High and low humidity during performance of finishing procedures.
 - f) Cloud cover at start of pour, Cloud cover at end of pour, and High and low cloud cover during performance of finishing procedures.
 - g) Screeding method and equipment used.
 - h) Saw cut method and equipment used.

- 2) Testing and Inspection Reports:
 - a) Testing Agency Testing and Inspecting Reports of concrete.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 SYSTEM

- A. Manufacturers:
 1. Manufacturer Contact List:
 - a. BASF Admixtures, Cleveland, OH www.basf-admixtures.com.
 - b. Bonsal American, Charlotte, NC www.bonsal.com.
 - c. Dayton Superior Specialty Chemicals, Kansas City, KS www.daytonsuperiorchemical.com.
 - d. Euclid Chemical Company, Cleveland, OH www.euclidchemical.com.
 - e. Fritz-Pak Concrete Admixtures, Dallas, TX www.fritzpak.com.
 - f. Grace Construction Products, Cambridge, MA www.graceconstruction.com and Grace Canada Inc, Ajax, ON (905) 683-8561.
 - g. L & M Construction Chemicals, Omaha, NE www.lmcc.com.
 - h. Larsen Weldcrete by Larsen Products Corp, Rockville, MD www.larsenproducts.com.
 - i. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com and Sika Canada, Pointe Claire, QC www.sika.ca.
 - j. Sonneborn / BASF Building Systems, Shakopee, MN www.chemrex.com.

- k. Unitex, Kansas City, MO www.unitex-chemicals.com.
- l. U S Mix Products Co, Denver, CO www.usspec.com.
- m. W R Meadows, Hampshire, IL www.wrmeadows.com.

B. Performance:

1. Design Criteria: Conform to requirements of ASTM C94/C94M unless specified otherwise:
 - a. Floor Slab for interior concrete slabs:
 - 1) Class 1 Floor:
 - a) Anticipated type of traffic: exposed surface – foot traffic.
 - b) Special considerations: Uniform finish, nonslip aggregated in specific areas, curing.
 - c) Final finish: Normal steel-troweled finish, nonslip finish where required.
 - 2) Meet requirements of ASTM C1116/C1116M, Type III.
 - 3) Alkali Resistance: Alkali proof.
2. Capacities:
 - a. For testing purposes, following concrete strengths are required:
 - 1) At 7 days: 60 percent minimum of 28 day strengths.
 - 2) At 28 days: 100 percent minimum of 28 day strengths.

C. Materials:

1. Table One:

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

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

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

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

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

Sieve	Percent Passing	Sieve	Percent Passing
1-1/2 Inch	100	38 mm	100

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

c. Fine:

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

a) Table Four:

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

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

5. Admixtures And Miscellaneous:

a. Mineral:

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

b. Chemical:

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

- b) Type Two Acceptable Products:
 - (1) Rheobuild 1000 or Glenium Series by BASF.
 - (2) Eucon 37 or Eucon 537 by Euclid.
 - (3) Supercizer 1 through 7 by Fritz-Pak.
 - (4) Sikament 300 by Sika.
 - (5) Daracem or ADVA Series by W R Grace.
 - (6) Equal as approved by Architect before use. See Section 01 6200.
- 6) Non-Chloride, Non-Corrosive Accelerating Admixture:
 - a) Meet requirements of ASTM C494/C494M, Type C or E and containing not more than 0.05 percent chloride ions.
 - b) Type Two Acceptable Products:
 - (1) Accelguard 80 by Euclid.
 - (2) Pozzolith NC 534 or 122HE or Pozzutec 20+.
 - (3) Daraset, Polarset or Lubricon by W R Grace.
 - (4) Equal as approved by Architect before use. See Section 01 6200.
- 7) Corrosion Inhibiting Admixture:
 - a) Liquid admixture to inhibit corrosion of steel reinforcement in concrete by introducing proper amount of anodic inhibitor. Admixture shall contain thirty (30) percent calcium nitrite solution and shall be used where called for in specifications or on drawings.
 - b) Type Two Acceptable Products:
 - (1) Eucon CIA by Euclid.
 - (2) DCI or DCI-S by W R Grace.
 - (3) Equal as approved by Architect before use. See Section 01 6200.
- 8) Alkali-Silica Reactivity Inhibiting Admixture:
 - a) Specially formulated lithium nitrate admixture for prevention of alkali-silica reactivity (ASR) in concrete. Admixture must have test data indicating conformance to ASTM C1293.
 - b) Type Two Acceptable Products:
 - (1) Eucon Integral ARC by Euclid.
 - (2) RASIR by W R Grace.
 - (3) Equal as approved by Architect before use. See Section 01 6200.
- 9) Viscosity Modifying Admixture (VMA):
 - a) Liquid admixture used to optimize viscosity of Self-Consolidating Concrete (SCC). Subject to compliance with requirements, provide following at dosage rates per manufacturer's recommendation.
 - b) Type Two Acceptable Products:
 - (1) Viscrol by Euclid.
 - (2) VMAR3 by W R Grace.
 - (3) Equal as approved by Architect before use. See Section 01 6200.
- 10) Shrinkage Reducing Admixture (SRA):
 - a) Liquid admixture specifically designed to reduce drying shrinkage and potential for cracking.
 - b) Type Two Acceptable Products:
 - (1) Eucon SRA by Euclid.
 - (2) Eclipse 4500 (exterior concrete) by W R Grace.
 - (3) Eclipse Floor 200 (interior concrete) by W R Grace.
 - (4) Equal as approved by Architect before use. See Section 01 6200.

2.2 ACCESSORIES

A. Bonding Agents:

- 1. Type Two Acceptable Products:
 - a. Acrylic Additive by Bonsal American.
 - b. Day Chem Ad Bond (J-40) by Dayton Superior.
 - c. Flex-Con by Euclid Chemical Co.
 - d. Larsen Weldcrete by Larsen Products Corp.
 - e. Everbond by L & M Construction Chemicals.
 - f. Acryl Set by BASF.

- g. Sonocrete by Sonneborn.
 - h. U S Spec Multicoat by U S Mix Products.
 - i. Intralok by W R Meadows.
 - j. Equal as approved by Architect before use. See Section 01 6200.
- B. Evaporation Retardant:
- 1. Type Two Acceptable Products:
 - a. Confilm by BASF.
 - b. Sure Film J-74 by Dayton Superior.
 - c. Eucobar By Euclid Chemical Co.
 - d. E-Con by L & M Construction Chemicals.
 - e. Pro Film by Unitex.
 - f. U S Spec Monofilm ER by U S Mix Products.
 - g. Equal as approved by Architect before use. See Section 01 6200.
- C. Expansion Filler Material:
- 1. Recycled PVC Joint Filler:
 - a. Design Criteria:
 - 1) Expansion joint filler manufactured from 100 percent recycled vinyl material meeting requirements of ASTM D1752 and AASHTO M-153.
 - 2) **1/2 inch (12.7 mm)** thick.
 - 3) Compressive/Recovery:
 - a) Meet requirements for ASTM D1752 recover minimum of 90 percent of original thickness.
 - 4) Light gray color.
 - b. Type One Approved Products:
 - 1) Proflex by Oscoda Plastics Inc, Oscoda, MI www.oscodaplastics.com.
 - 2) Equal as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Concrete Mixing:
- 1. General:
 - a. All concrete shall be machine mixed.
 - b. Water gauge shall be provided to deliver exact predetermined amount of water for each batch.
 - c. reliable system must be employed to insure that no less than predetermined amount of cement goes into each batch.
 - d. Re-tempering partly set concrete will not be permitted.
 - 2. Transit Mix:
 - a. Transit mix concrete may be used provided it conforms to Specifications and tests herein described and ASTM C94/C94M.
 - b. Central plant producing concrete and equipment transporting it are suitable for production and transportation of controlled concrete and plant is currently approved by local state DOT.
 - c. Maximum elapsed time between time of introduction of water and placing shall be one (1) hour.
 - d. Minimum time of mixing shall be one (1) minute per cubic yard after all material, including water, has been placed in drum, and drum shall be reversed for an additional two (2) minutes.
 - e. Mixing water shall be added only in presence of Inspecting Engineer or inspector employed by Testing Agency.
 - f. Trucks shall not be overloaded in excess of rated capacity as recommended by manufacturer.
- B. Surface Preparation:

1. Inserts, bolts, boxes, templates, pipes, conduits, and other accessories required by Divisions 22, 23, and 26 shall be installed and inspected before placing concrete.
2. Install inserts, bolts, boxes, templates, pipes, conduits, and other accessories furnished under other Sections to be installed as part of work of this Section.
 - a. Tie anchor bolts for hold-down anchors and columns securely to reinforcing steel.

C. Removal:

1. Remove water and debris from space to be placed.

3.2 INSTALLATION

A. Special Techniques:

1. Cold Weather Concreting Procedures:
 - a. General Requirements:
 - 1) Materials and equipment required for heating and protection of concrete shall be approved and available at Project site before beginning cold weather concreting.
 - a) Heating devices used to maintain specified temperatures shall have baffle plate above, of sufficient size, and sand bed below, in order to distribute heat.
 - b) Heating devices shall be so operated that temperature of air immediately below slab forms shall not exceed **100 deg F (37.8 deg C)**. Provide sufficient and suitable thermometers to verify compliance.
 - 2) Forms, reinforcement, metallic embedments, and fillers shall be free from snow, ice, and frost. Surfaces that will be in contact with newly placed concrete, including sub-grade materials, shall be **35 deg F (2 deg C)** minimum at time of concrete placement.
 - 3) Thaw sub-grade **6 inches (150 mm)** deep minimum before beginning concrete placement. If necessary, re-compact thawed material.
 - 4) Use no frozen materials or materials containing ice.
 - 5) No salt or other chemical may be used for such protection.
 - 6) Only specified non-corrosive non-chloride accelerator shall be used. Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.
 - b. Requirements When Average twenty four (24) Hour Temperature, midnight to midnight, Is Below **40 deg F (4 deg C)**:
 - 1) Temperature of concrete as placed and maintained shall be **55 deg F (13 deg C)** minimum and **75 deg F (27 deg C)** maximum.
 - 2) Heat concrete for seventy two (72) hours minimum after placing if regular cement is used; for 48 hours if high early strength cement is used; or longer if determined necessary by Architect.
 - a) During this period, maintain concrete surface temperature between **55 and 75 deg F (13 and 27 deg C)**.
 - 3) Vent flue gases from combustion heating units to outside of enclosure to prevent carbonation of concrete surface.
 - 4) Prevent concrete from drying during heating period. Maintain housing, insulation, covering, and other protection twenty four (24) hours after heat is discontinued.
 - 5) After heating period, if temperature falls below **32 deg F (0 deg C)**, protect concrete from freezing until strength of **2000 psi (13.79 MPa)** minimum is achieved.
 - a) Protect flatwork exposed to melting snow or rain during day and freezing during night from freezing until strength of **3500 psi (24.13 MPa)** minimum is achieved.
 - c. Requirements When Average twenty four (24) Hour Temperature, midnight to midnight, Is Above **40 deg F (4 deg C)**, but when temperature falls below **32 deg F (0 deg C)**:
 - 1) Protect concrete from freezing for seventy two (72) hours after placing, or until strength of **2000 psi (13.79 MPa)** is achieved, whichever is longer.
 - 2) Protect flatwork exposed to melting snow or rain during day and freezing during night from freezing until strength of **3500 psi (24.13 MPa)** minimum is achieved.
 - d. Protect soil supporting concrete footings from freezing under any circumstances.
2. Hot Weather Concreting Procedures:
 - a. Maximum concrete temperature allowed is **90 deg F (32 deg C)** in hot weather.
 - b. Cool aggregate and subgrades by sprinkling.
 - c. Avoid cement over **140 deg F (60 deg C)**.

- d. Use cold mixing water or ice.
- e. Use fog spray or evaporation retardant to lessen rapid evaporation from concrete surface.

B. Tolerances:

1. Tolerances shall conform to requirements of ACI 117 or CSA A23.1, except where specified differently:
 - a. Floor test surfaces shall be measured and reported within seventy two (72) hours after completion of slab concrete finishing operations and before removal of any supporting shores to eliminate any curling effect F-numbers.
2. Local Flatness / Levelness of Interior Slabs (Carpet and Tile Areas):
 - a. Specified Overall Value of F_F30 / F_L24 and Minimum Local Value of F_F20 / F_L15 when tested in accordance with ASTM E1155.
 - b. Table Five: 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 max standard, 1/2 inch at masonry	50 mm max 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 max	12.7 mm max
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

- c. Remedy For Out-of-Tolerance Building Slabs (Carpet Areas):
 - 1) Sections of slabs to be covered by carpet, 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.
 - 2) Remove and replace sections of slabs measuring outside specified correctable tolerances.

C. Placing:

1. General:
 - a. Structural
2. General:
 - a. Place as soon after mixing as possible.
 - b. Deposit as nearly as possible in final position.
 - c. No concrete shall be deposited in water.
 - d. Placing of concrete shall be continuous until panel or section is complete.
 - e. In order to avoid overloading of forms and ties, observe following rate of filling for various air temperatures:
 - 1) Table Six: Placing Rate.

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

- f. Compact concrete in forms by vibrating and other means where required.
 - 1) Thoroughly consolidate concrete around reinforcing bars (Consolidation not required in concrete around reinforcing bars with Mix Type F).
 - 2) Use and type of vibrators shall conform to ACI 309.
- g. Consolidate concrete thoroughly.

- h. Do not embed aluminum in concrete.
 - i. Do not use contaminated, deteriorated, or re-tempered concrete.
 - j. Avoid accumulation of hardened concrete.
 3. Footings:
 - a. Bear **15 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"** minimum below finish grades.
 - b. Level top of finish footing and leave rough.
 - c. Where joints are required, bulkhead, key horizontally, and dowel with two No. 5 reinforcing bars, **48 inches (1 200 mm)** long.
 4. Foundations And Walls: Leave steel projecting where required for floor tie.
 5. Exterior Slabs:
 - a. Dusting with cement not permitted.
 - b. For continuous placing and where shown on Drawings, saw cut one inch deep control joints before shrinkage occurs (**2 inches at 6 inch slabs**) (**50 mm at 150 mm slabs**).
 6. Equipment Bases: Coordinate with appropriate Sections for locations and dimensions.
 7. Joints:
 - a. Where possible, locate joints under partitions or where joints will cause least disruption to floor coverings.
 - b. Construction Joints: Locate where shown on Drawings to least impair strength of completed structure. Construction joints in foundation walls shall not occur within **6 feet (1.80 meters)** of corner and be keyed.
 8. Bonding Fresh And Hardened Concrete:
 - a. Re-tighten forms.
 - b. Roughen surfaces.
 - c. Clean off foreign matter and laitance.
 - d. Wet but do not saturate.
 - e. Slush with neat cement grout or apply bonding agent.
 - f. Proceed with placing new concrete.
 9. Anchor Bolts:
 - a. Place anchor bolts not tied to reinforcing steel immediately following leveling of concrete. Reconsolidate concrete around bolt immediately after placing bolt.
 - b. Do not disturb bolts during finishing process.
 10. Substrate For Geocomposite Foundation Drainage System:
 - a. Concrete surfaces shall be of sound structural grade and have smooth finish free of fins, ridges, protrusions, rough spalled areas, loose aggregate, exposed course aggregate, voids and entrained air holes. Rough surfaces shall receive well-adhered parge coat.
 - b. Repair voids, rock pockets, and excessively rough surfaces with approved non-shrink grout or grind to match unrepaired areas.
 - c. Surfaces at cold joints shall be on same plane.
- D. Finishing:
1. Rubbed Finish, Exposed Vertical Surfaces:
 - a. Smooth Rubbed Finish shall be as specified in Section 03 3053.
 2. Steel Trowel Finishes, Interior Flatwork:
 - a. Float and steel trowel interior slabs after concrete has set enough to avoid bringing water and fines to surface.
 - b. If power troweling is used, get approval of finish from Architect.
 3. Broom Finishes, Exterior Flatwork Not Specified in Section 03 3053:
 - a. Broom finish exterior slabs.
 - b. Round edges including edges formed by expansion joints.
 - c. Remove edger marks.
 4. Rough: Top of slabs to receive setting bed for ceramic or paver tile.
- E. Curing:
1. Interior Slabs:
 - a. Water cure as specified in Section 03 3913.
 - b. Membrane cure as specified in Section 03 3923.
 2. All Other Concrete Flatwork And Curbs: Membrane cure as specified in Section 03 3923.

3.3 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Concrete:

- a. Testing Agency shall provide testing and inspection for concrete as per ASTM C1077.
- b. Testing Agency will sample and test for quality control during placement of concrete as directed by Architect.
- c. Testing and inspections, if performed, will include following:
 - 1) Periodic inspection verifying use of required design mix.
 - 2) Inspection at time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine temperature of concrete.
 - 3) Inspection of concrete and shotcrete placement for proper application techniques.
 - 4) Periodic inspection for maintenance of specified curing temperature and techniques.
 - 5) Periodic inspect of formwork for shape, location and dimensions of concrete member being formed:
 - a) Certified Inspector shall inspect forms for general location, configuration, camber, shoring, sealing of form joints, correct forming material, concrete accessories, and form tie locations.
 - 6) Concrete floor flatness and floor levelness or interior slabs as per ASTM E1155.
 - 7) Concrete moisture and alkalinity testing. See Section 09 0503 Flooring Substrate Preparation.
- d. Testing Agency will sample and test during placement of concrete as directed by Architect and may include following:
 - 1) Sampling Fresh Concrete: ASTM C172/C172M, except modified for slump to comply with ASTM C94/C94M:
 - a) Slump: ASTM C143/C143M, test each time set of compressive specimens are made.
 - b) Air Content: ASTM C173/C173M, volumetric method for lightweight or normal weight concrete: ASTM C231/C231M, pressure method for normal weight concrete each time set of compression test specimens are made.
 - c) Concrete Temperature: Test each time set of compressive specimens are made.
 - d) Unit Weight: ASTM C567/C567M, Test each time set of compressive specimens are made.
 - e. Compression Test Specimen: ASTM C31/C31M; one (1) set of four (4) standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
 - f. Compressive Strength Tests: ASTM C39/C39M: Provide six (6) random sets for site cast concrete (sidewalks, curbs, gutters, etc.), two (2) random sets for footings, two (2) random sets for foundation walls and two (2) random sets for interior concrete slabs on grade.
 - 1) One (1) specimen tested at seven (7) days, two (2) specimens tested at twenty eight (28) days, and one (1) specimen retained in reserve for later testing if required.
 - 2) If strength of field-cured cylinders is less than eighty five (85) percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing in-place concrete.
 - 3) Strength level of concrete will be considered satisfactory if averages of sets of three (3) consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than **500 psi (3.45 MPa)**.

2. Reinforcement Bars and Bolts:

- a. Inspection of Reinforcement Bars and Bolts is not required for Project.
 - a) Periodic inspection of anchors installed in hardened concrete.

3.4 PROTECTION

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

- B. Do not allow materials resulting from construction activities, which will affect concrete or application of finish floor systems adversely, to come in contact with interior concrete slabs.
- C. Protect interior concrete floors from stains, paint, mortar and other construction activities.

END OF SECTION

SECTION 03 3923**MEMBRANE CONCRETE CURING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Quality of membrane concrete curing as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 03 3053: 'Miscellaneous Cast-In-Place Concrete'.
 - 2. Section 03 3111: 'Normal-Weight Structural Concrete'.

1.2 REFERENCES

- A. Reference Standards:
 - 1. 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. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Printed installation instructions.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Exterior:
 - 1. Low VOC (less than 350 grams per liter), water-borne, membrane forming curing compound meeting requirements of ASTM C309, Type 2.
 - 2. Horizontal Miscellaneous Cast-In-Place Concrete:
 - a. Class Two Quality Standard. See Section 01 6200 for definition of Classes.
 - 1) Vocomp 20 Cure and Seal by W. R. Meadows.
 - 3. Concrete Paving:
 - a. Class Two Quality Standard. See Section 01 6200 for definition of Classes:
 - 1) 1200 White by W. R. Meadows.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Protect surfaces that will be receiving products or systems incompatible with curing compounds.
2. Where such surfaces do receive curing compound, remove to extent required by installer of products and systems to be subsequently installed and at no additional cost to Owner.

3.2 APPLICATION

A. Interface With Other Work:

1. Apply concrete sealer finishing approximately 1/2 hour before application of Membrane Concrete Curing.

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 grout.

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 C33/C33M-11a, 'Standard Specification for Concrete Aggregates'.
 - b. ASTM C78/C78M-10, 'Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)'.
 - c. ASTM C109/C109M-11b, 'Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)'.
 - d. ASTM C191-08, 'Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle'.
 - e. ASTM C230/C230M-08, 'Standard Specification for Flow Table for Use in Tests of Hydraulic Cement'.
 - f. ASTM C266-08e1, 'Standard Test Method for Time of Setting of Hydraulic-Cement Paste by Gillmore Needles'.
 - g. ASTM C293/C293M-10, 'Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading)'.
 - h. ASTM C307-03(2008), 'Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing'.
 - i. ASTM C309-11, 'Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete'.
 - j. ASTM C348-08, 'Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars'.
 - k. ASTM C469/C469M-10, 'Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression'.
 - l. ASTM C496/C496M-04e1, 'Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens'.
 - m. ASTM C531-00(2005), 'Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes'.
 - n. ASTM C579-01(2006), 'Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes'.

- o. ASTM C580-02(2008), 'Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes'.
 - p. ASTM C666/C666M-03(2008), 'Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing'.
 - q. ASTM C827/C827M-10, 'Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures'.
 - r. ASTM C882/C882M-12, 'Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear'.
 - s. ASTM C939-10, 'Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)'.
 - t. ASTM C940-10a, 'Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory'.
 - u. ASTM C942-10, 'Standard Test Method for Compressive Strength of Grouts for Preplaced-Aggregate Concrete in the Laboratory'.
 - v. ASTM C1090-10, 'Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout'.
 - w. ASTM C1107/C1107M-11, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).'
 - x. ASTM C1202-12, 'Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration'.
 - y. ASTM E488-10, 'Standard Test Methods for Strength of Anchors in Concrete Elements'.
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.fivestarproducts.com.
 6. Duragrout by L&M Construction Chemicals Inc., Omaha, NE www.lmcc.com.
 7. Planigrout 712 by MAPEI Corporation, Deerfield Beach, FL www.mapei.US or Mapei Inc., Laval, QC www.mapei.com/CA.
 8. SikaGrout 212 by Sika Corporation, Lyndhurst, NJ www.usa.sika.com or Sika Canada, Inc. Pointe-Claire, QC www.can.sika.com.
 9. MP Grout by US Mix Products Company, Denver, CO www.usspec.com.
 10. Sealtight CG-86 Grout by W R Meadows, Hampshire, IL www.meadows.com.
 11. Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Preparation:
1. Prepare concrete surfaces in accordance with Manufacturer's written instructions:
 2. Remove all loose materials.
 3. Clean surface of any substance that could interfere with bond on material including dirt, paint, tar, asphalt, wax, oil, grease, latex compounds, form release agents, laitance, loose toppings, foreign substances and any other residues.
 4. Saturate area to be grouted with water in accordance with Manufacturer's written instructions.

3.3 APPLICATION

- A. General:
1. Follow Manufacturer's recommended thickness.
- B. Mixing:
1. Mix grout in accordance with Manufacturer's written instructions.
 2. Add mix water in amount in accordance with Manufacturer's written instructions to provide required placing consistency.
 3. Do not add water in amount that will cause bleeding or segregation of mixed grout.
 4. Do not add any sand, cement, admixtures, or fluidifiers to grout.
- C. Placement:
1. Place grout in accordance with Manufacturer's written instruction including but not limited to the following:
 - a. Proper curing is required.
 - b. Use cold weather or hot weather grouting procedures in accordance with Manufacturer's written instructions, as temperature dictates:
 - 1) Do not use at temperatures that may cause premature freezing.
 - 2) Do not allow to freeze until 4000 psi (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

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SECTION 03 6300**EPOXY GROUTING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited to:
1. Furnish and install epoxy grouting as described in Contract Documents.

1.2 REFERENCES

- A. Reference Standards:
1. American Society For Testing And Materials:
 - a. ASTM D 638-00, 'Standard Test Method for Tensile Properties of Plastics.'

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Epoxy Grout:
1. Type One Acceptable Products to be used in Concrete Applications:
 - a. "HIT RE 500" by Hilti Corporation
 - b. "SET-XP" by Simpson Strong Tie
 - c. Equal as approved by Architect before bidding. See Section 01 6200.
 2. Acceptable Products to be used in Masonry Applications:
 - a. "HIT HY 150 MAX" or "HIT HY 70" by Hilti Corporation (In grouted cells)
 - b. "HIT HY 70" by Hilti Corporation (In un-reinforced masonry cells w/screen tubes)
 - c. "SET-EPOXY-TIE" by Simpson Strong Tie
 - d. "Power-Fast" by Powers Fasteners
 - e. Equal as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. All drilled holes for anchor rods 1" in diameter and smaller shall be 1/8" larger than the anchor rod being installed. All drilled holes for anchor rods greater than 1" in diameter shall be 1/4" larger than the bar or anchor rod being installed.
- B. After drilling the proper size hole, clean the walls and bottom of the drilled hole of all dust and debris using a nylon brush in conjunction with oil free compressed air. The hole shall be free of dust, dirt, debris and standing water.
- C. Follow all manufacturers' recommendations for epoxy installation.

END OF SECTION

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DIVISION 04: MASONRY

04 0500 COMMON WORK RESULTS FOR MASONRY

04 0513 CEMENT AND LIME MASONRY MORTARING
04 0516 MASONRY GROUTING
04 0521 MASONRY VENEER TIES
04 0523 MASONRY ACCESSORIES

04 2000 UNIT MASONRY

04 2113 BRICK VENEER MASONRY

END OF TABLE OF CONTENTS

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SECTION 04 0513**CEMENT AND LIME MASONRY MORTARING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Quality of masonry mortar used on Project.
- B. Related Requirements:
 - 1. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - 2. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - 3. Sections Under 04 2000 Heading: Furnish and install mortar.

1.2 REFERENCES

- A. Definitions:
 - 1. Mortar: Plastic mixture of cementitious materials, fine aggregate and water. See ASTM C270.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C144-11, 'Standard Specification for Aggregate for Masonry Mortar'.
 - b. ASTM C150/C150M-12, 'Standard Specification for Portland Cement'.
 - c. ASTM C207-06(2011), 'Standard Specification for Hydrated Lime for Masonry Purposes'.
 - d. ASTM C270-12a, 'Standard Specification for Mortar for Unit Masonry'.

1.3 SUBMITTALS

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

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Performance:
 - 1. Minimum Compressive Strength at 28 Days:
 - a. Type N: 750 psi (5.17 MPa).
- B. Materials:
 - 1. Portland Cement:
 - a. Meet requirements of ASTM C150, Type II Low Alkali unless approved otherwise in writing by Architect.
 - 2. Hydrated Lime:
 - a. Meet requirements of ASTM C207, Type S.

3. Aggregate:

a. Standard Mortar:

- 1) Natural or manufactured sand meeting requirements of ASTM C144 and following:
 - a) Fineness modulus: 1.6 to 2.5 percent
 - b) Water demand, ratio by weight: 0.65 percent maximum
 - c) Grading:

Sieve	Sieve	Percent Passing	
		Natural Sand	Manufactured Sand
No. 4	4.750 mm	100	100
No. 8	2.360 mm	95 to 100	95 to 100
No. 16	1.191 mm	70 to 100	70 to 100
No. 30	0.594 mm	40 to 75	40 to 75
No. 50	0.297 mm	10 to 35	20 to 40
No. 100	0.150 mm	2 to 15	10 to 25
No. 200	0.075 mm	none	0 to 10

b. Stone Unit Masonry Mortar:

- 1) White Mortar Aggregates:
 - a) Natural white sand or ground white stone.
- 2) Colored Mortar Aggregates:
 - a) Ground marble, granite, or other sound stone, as required to match Architect's sample.
- 3) Grading requirements for joints narrower than 1/4 inch (6 mm):

Sieve	Sieve	Percent Passing	
		Natural Sand	Manufactured Sand
No. 8	2.360 mm	100	100
No. 16	1.191 mm	95 to 100	95 to 100
No. 30	0.594 mm	40 to 75	40 to 75
No. 50	0.297 mm	10 to 35	20 to 40
No. 100	0.150 mm	2 to 15	10 to 25
No. 200	0.075 mm	none	0 to 10

4) Grading requirements for pointing mortar:

Sieve	Sieve	Percent Passing	
		Natural Sand	Manufactured Sand
No. 16	1.191 mm	100	100
No. 30	0.594 mm	40 to 75	40 to 75
No. 50	0.297 mm	10 to 35	20 to 40
No. 100	0.150 mm	2 to 15	10 to 25
No. 200	0.075 mm	none	0 to 10

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.
- 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 deg C).
2. Unit Masonry Mortar: Type 'N'
 - a. Parts by Volume:

Portland Cement	1
Hydrated Lime	1

Damp Loose Sand: 2-1/4 minimum to three maximum, times sum of volumes of cement and lime used. Maintain sand piles in damp, loose condition.
 - b. Parts by Weight:

Portland Cement	94 lbs	43 kg
Hydrated Lime	40 lbs	18 kg
Dry Sand	360 lbs min. to 480 lbs max.	163 kg min. to 218 kg max.

3. Stonework Mortar:
 - a. One part Portland cement to three parts of sand.
 - b. Mix in water until it will retain its form when compressed in hand.

PART 3 - EXECUTION: Not Used

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 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - 2. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - 3. Sections under 04 2000 heading: Furnish and install masonry grout.

1.2 REFERENCES

- A. Definitions:
 - 1. Grout: Mixture of cementitious material and aggregate to which sufficient water is added to produce pouring consistency without segregation of the constituents.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C94/C94M-12, 'Standard Specification for Ready-Mixed Concrete'.
 - b. ASTM C150/C150M-12, 'Standard Specification for Portland Cement'.
 - c. ASTM C207-06(2011), 'Standard Specification for Hydrated Lime for Masonry Purposes'.
 - d. ASTM C404-11, 'Standard Specification for Aggregates for Masonry Grout'.
 - e. ASTM C476-10, 'Standard Specification for Grout for Masonry'.
 - f. ASTM C1019-11, 'Standard Test Method for Sampling and Testing Grout'.

1.3 SUBMITTALS

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

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Performance
 - 1. Minimum Compressive Strength for laboratory cured specimens at 28 Days:
 - a. 2000 psi (13.8 MPa).
- B. Materials:
 - 1. Portland Cement:
 - a. Meet requirements of ASTM C150/C150M.

- b. Use Type II Low Alkali in exterior walls and in walls subject to moisture, unless approved otherwise in writing by Architect.
- 2. Hydrated Lime:
 - a. Meet requirements of ASTM C207, Type S.
- 3. Aggregate:
 - a. Meet requirements of ASTM C404, Table 1.

1) Grading Requirements for Fine Aggregate, Natural, Size 2.

Sieve	Sieve	Percent Passing
No. 4	4.750 mm	100
No. 8	2.360 mm	95 - 100
No. 16	1.191 mm	60 - 100
No. 30	0.595 mm	35 - 70
No. 50	0.297 mm	15 - 35
No. 100	0.150 mm	2 - 15

2) Grading Requirements for Coarse Aggregate, Size 8.

Sieve	Sieve	Percent Passing
1/2 Inch	12.7 mm	100
3/8 Inch	9.5 mm	85 - 100
No. 4	4.750 mm	10 - 30
No. 8	2.360 mm	0 - 10
No. 16	0.150 mm	0 - 5

- 4. Water:
 - a. Clean and free of acids, alkalis, and organic materials.
- 5. Admixtures:
 - a. No additives are allowed which will increase air entrainment. Other additives may be used as approved in writing by Architect before use.

C. Mixes:

- 1. Procedure:
 - a. Use of pre-blended dry grout mix is allowed only with submission of certification that material specification requirements have been complied with.
 - b. Use method of measuring and mixing materials that will ensure consistently proportioned grout batches throughout installation of masonry work. No measuring of materials by 'shovels full' is permitted for field mixed grout.
 - c. Batch, mix, and deliver transit-mixed grout in accordance with requirements of ASTM C94/C94M.
- 2. Proportions by Volume:
 - a. Water: Enough to give creamy pouring consistency, usually slump of between 8 and 10.

Material	Fine Grout		Coarse Grout	
Portland Cement	One cu ft	0.028 cu m	One cu ft	0.028 cu m
Hydrated Lime (optional)	1/10 cu ft	0.0028 cu m	1/10 cu ft	0.0028 cu m
Damp, Loose Sand	2-1/4 to 3 cu ft	0.063 to 0.084 cu m	2-1/4 to 3 cu ft	0.063 to 0.084 cu m
Pea Gravel	none	none	1 to 2 cu ft	0.028 to 0.056 cu m

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use fine grout for cavities **2 inches (50 mm)** and smaller in smallest dimension. Use coarse grout for cavities greater than **2 inches (50 mm)** in smallest dimension.

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 veneering masonry on framed walls.
 - 2. Dovetail anchors and slots for veneering masonry on cast-in-place concrete.
 - 3. Ties for veneering cut or field stone masonry on CMU or framing.
- B. Related Requirements:
 - 1. Section 03 3111: Installation of dovetail slots.
 - 2. Section 04 2223: Installation of anchor and tie system.

1.2 REFERENCES

- A. Reference Standards:
 - 1. ASTM International:
 - a. ASTM A153/A153M-09, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
 - b. ASTM D412-06ae2, 'Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension'.
 - c. ASTM E96/E96M-10, 'Standard Test Methods for Water Vapor Transmission of Materials'.

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 recommendations for each item.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Manufacturers:
 - 1. Manufacturer Contact Information:
 - a. Dundee Manufacturing Company, Dundee MI www.dundeemfgco.com.
 - b. Heckman Building Products Inc, Melrose Park, IL www.heckmannbuildingprods.com.
 - c. Hohmann & Barnard, Hauppauge, NY www.h-b.com.
 - d. ITW Buildex, Div. of Illinois Tool Works, Itasca, IL www.itwbuildex.com.
 - e. Masonry Reinforcing Corporation of America, Charlotte, NC www.wirebond.com.
- B. Unit Masonry Over Framing:

1. Brick Ties:
 - a. Design Criteria:
 - 1) Seismic Design Categories D E, and F. Seismic ties are required in Seismic Design Categories D, E and F.
 - b. Class One Quality Standard:
 - 1) 345 SV Seismic-Notch Veneer Anchor, by Hohmann & Barnard:
 - a) Comply with seismic codes requiring continuous wire to be an integral component of the anchor system in masonry veneer.
 - b) Finish: Hot dipped galvanized (ASTM A153/A153M, Class B-2).
 - 2) 360 L-Type Seismic Anchor, by Heckman Building Products Inc.
 - a) Finish: Hot dipped galvanized (ASTM A153/A153M, Class B-2).
 - 3) 364 SV Seismic-Notch Gripstray Anchor, by Hohmann & Barnard:
 - a) Comply with seismic codes requiring continuous wire to be an integral component of the anchor system in masonry veneer.
 - b) Finish: Hot dipped galvanized (ASTM A153/A153M, Class B-2).
 - 4) HB 200 Adjustable Veneer Anchor by Hohmann & Barnard:
 - a) Accommodate 0 inch to 4 inch 0.00 inches (0.00 mm to 100mm) insulation thickness.
 - b) HFinish: Hot dipped galvanized.
 - 5) Equal from Heckman or Hohmann & Barnard. See Section 01 6200.
- C. Unit Masonry Over Framing And Exterior Rigid Insulation:
 1. Brick Ties:
 - a. Design Criteria:
 - 1) Seismic Design Categories D E, and F. Seismic ties are required in Seismic Design Categories D, E and F.
 - b. Type Two Acceptable Products:
 - 1) 345 SV Seismic-Notch Veneer Anchor, by Hohmann & Barnard:
 - a) Comply with seismic codes requiring continuous wire to be an integral component of the anchor system in masonry veneer.
 - b) Finish: Hot dipped galvanized (ASTM A153/A153M, Class B-2).
 - 2) 360 L-Type Seismic Anchor, by Heckman Building Products Inc.
 - a) Finish: Hot dipped galvanized (ASTM A153/A153M, Class B-2).
 - 3) 364 SV Seismic-Notch Gripstray Anchor, by Hohmann & Barnard:
 - a) Comply with seismic codes requiring continuous wire to be an integral component of the anchor system in masonry veneer.
 - b) Finish: Hot dipped galvanized (ASTM A153/A153M, Class B-2).
 - 4) HB 200 Adjustable Veneer Anchor by Hohmann & Barnard:
 - a) Accommodate 0 inch to 4 inch 0.00 inches (0.00 mm to 100mm) insulation thickness.
 - b) HFinish: Hot dipped galvanized.
 - 5) Equal from Heckman or Hohmann & Barnard. See Section 01 6200.
 2. Fasteners:
 - a. Class Two Quality Standards. See Section 01 6200:
 - 1) Wood Framing: Non-corrosive wood screws of length, type, and quantity recommended by Manufacturer.
 - D. Dovetail Anchors:
 1. Class Two Quality Standards. See Section 01 6200:
 - a. Dovetail Slots: 305 by Hohmann & Barnard.
 - 1) Finish: Hot dipped galvanized.
 - b. Dovetail Anchors: 303 by Hohmann & Barnard.
 - 1) Finish: Hot dipped galvanized.

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. Weep vents.
 - 6. Vents (open head joints).

- B. Related Requirements:
 - 1. Sections under 04 2000 heading: Installation.

1.2 REFERENCES

- A. Definitions:
 - 1. Cavity Wall Flashing: Same as flexible flashing.
 - 2. 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.
 - 3. Foundation Flashing: Same as flexible flashing.
 - 4. Head And Sill Flashing: Same as flexible flashing.
 - 5. Stainless Steel: Stainless steels are alloys of iron to which at least 10 percent chromium has been added to increase corrosion resistance and will not rust when exposed to weather. To obtain greater corrosion resistance, more nickel and chromium are added to the alloy. Along with iron and chromium, all stainless steels contain some carbon to make it stronger.
 - a. Austenitic Stainless Steel: Most popular of the stainless steels because of their ductility, ease of working and good corrosion resistance. Widely known as the 300 series.
 - 6. Stainless Steel Alloys:
 - a. Type 304 (UNS S30400): Austenitic stainless steel with non-magnetic properties in annealed condition that provide good corrosion resistance to both chemical and atmospheric exposures, with high resistance to oxidations. Most common and widely used stainless steel.
 - 7. Through-Wall Flashing: Generally considered same as flexible flashing.
 - 8. Weep Hole: Opening placed in mortar joints of facing material at level of flashing, to permit escape of moisture.
 - 9. Weep Vent: Inserts placed in Weep Hole to screen insects from entering but allowing escape of moisture.
 - 10. 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.

- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM A153/A153M-09, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
 - b. ASTM A167-99(2009), 'Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip'.
 - c. ASTM A580/A580M-12a, 'Standard Specification for Stainless Steel Wire'.

- d. ASTM D903-98(2010), 'Standard Test Method for Peel or Stripping Strength of Adhesive Bonds'.
- e. ASTM D1056-07, 'Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber'.

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 recommendations 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. 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.

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) Equals 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) Equals 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) Equals 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) Equals 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. 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) Equals as approved by Architect before bidding. See Section 01 6200.
 - d. 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) Equals as approved by Architect before bidding. See Section 01 6200.
3. Control and Expansion Joints:
- a. Description:
 - 1) Closed Cell Neoprene Sponge without tear strip placed horizontally beneath relieving angle, or in vertical expansion joint to act as control joint.
 - b. Design Criteria:
 - 1) Meet requirements of ASTM D1056 Grade 2A1.
 - c. Type One Acceptable Products:
 - 1) NS Closed cell neoprene sponge by Hohmann & Barnard.
 - 2) Equals as approved by Architect.
4. 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) Equals as approved by Architect.

PART 3 - EXECUTION: Not Used

END OF SECTION

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SECTION 04 2113**BRICK VENEER 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. Weep vents.
 2. Masonry Veneer Ties.
 3. Metal Lintels.
- C. Related Requirements:
1. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 2. Section 01 4301: 'Quality Assurance – Qualifications' for minimum qualification levels required.
 3. Sections Under 04 0000 Heading: 'Masonry':
 - a. Pre-installation conference held jointly with other masonry related sections.
 4. Section 04 0513: 'Cement and Lime Masonry Mortaring' for quality of mortar.
 5. Section 04 0521: 'Masonry Veneer Ties' for quality of masonry veneer ties.
 6. Section 04 0523: 'Masonry Accessories' for furnishing drip edge/plate, flexible flashing, mortar guard and weep vents.
 7. Section 05 1223: 'Structural Steel Buildings' for metal lintels.
 8. Section 07 9213: 'Elastomeric Joint Sealants'.

1.2 REFERENCES

- A. Association Publications:
1. The Brick Industry Association, Reston VA: 'Technical Notes on Brick Construction' (July 2012), www.gobrick.com.
 - a. Technical Notes on Brick Construction 1, 'Cold and Hot weather Construction' (June 2006).
 - b. Technical Notes on Brick Construction 3, 'Overview of Building Code Requirements for Masonry Structures (ACI 530-02/ASCE 5-02/TMS 402-02) and Specification for Masonry Structures (ACI 530.1-02/ASCE 6-02/TMS 602-02)'.
 - c. Technical Notes on Brick Construction 9A, 'Specifications for and Classification of Brick' (October 2007).
 - d. Technical Notes on Brick Construction 20, 'Cleaning Brickwork' (June 2006).
 - e. Technical Notes on Brick Construction 21C, 'Brick Masonry Cavity Walls - Construction' (October 1989).
 - f. Technical Notes on Brick Construction 23, 'Stains - Identification and Prevention' (June 2006).
 - g. Technical Notes on Brick Construction 23A, 'Efflorescence - Causes and Prevention' (June 2006).
 - h. Technical Notes on Brick Construction 28, 'Anchored Brick Veneer, Wood Frame Construction' (August 2002).
- B. Definitions:

1. Brick Classifications:
 - a. Grade, class, type, application and use:
 - 1) Criteria for these classifications may include exposure or use conditions; appearance items; physical properties needed for performance; tolerances on dimensions and distortion; chippage; and void area.
 - 2) Brick qualify for particular classification based on their properties after manufacturing. While most brick can be manufactured to attain all attributes desired, certain attributes may be dictated by production method, durability classification or appearance classification designated by user:
 - a) For example, molded brick cannot be made to meet classification for tightest dimensional tolerances since production method uses a higher percentage of water that may result in greater shrinkage.
 - b) Brick manufactured by extrusion process can be made to meet classification for light or loose dimensional tolerances.
 - b. Brick Color:
 - 1) There are no color-related tolerances in ASTM standards for brick. Standards are dictated by sample panel, mockups, or project specification.
 - c. Brick Grade: Designation for 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. Following are brick grades classifications based on the Weathering Index:
 - a) SW: Severe weathering.
 - b) MW: Moderate weathering.
 - c) NW: Negligible or no weathering.
 - 2) Grade SW is stronger and more durable, and require less maintenance. Grade MW is less durable. Grade NW is least durable and should only be used for interior work.
 - d. Brick Type:
 - 1) Limits include tolerances on dimensions, distortion, out-or-square and chippage. Appearance classification is established on size and precision attained in manufacturing. Following are brick types:
 - a) Type FBX: Brick for general use in masonry where higher degree of precision and lower permissible variation in size than permitted for Type FBS is required:
 - (1) Type FBX maintains strict requirements on absorption, waste, chipping, cracks, dimensions and distortion (warpage). Type FBX allows very narrow color range, minimal size variations, and uniform in appearance).
 - b) Type FBS: Brick for general use in masonry:
 - (1) Type FBS offer wider range of color and size variations, but lack of production controls results in many odd color lots.
 - c) Type FBA: Brick for general use in masonry selected to produce characteristic architectural effects resulting from non-uniformity in size and texture of individual units:
 - (1) Type FBA is used for aesthetic qualities. FBA have no limits for size and color variations.
2. Cold Weather, as referred to in this Section, is four (4) hours with ambient temperature below **40 deg F (4 deg C)** in twenty four (24) hour period.
3. 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.
4. Facing Brick: Intended for use in both structural and nonstructural masonry, including veneer, where appearance is a requirement.
5. 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.
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 (12.9 kph)** or greater.
7. Mortar: Plastic mixture of cementitious materials, fine aggregate and water (See ASTM C270 or ASTM C476).

8. 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.
9. 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 brick.
10. Veneer: Single wythe of masonry for facing purposes, not structurally bonded.
11. Warpage: Distortion of surfaces or edges of an individual brick from a plane surface or from straight line.
12. Weep Hole: Opening placed in mortar joints of facing material at level of flashing, to permit escape of moisture.
13. Weep Vent: Inserts placed in Weep Hole to screen insects from entering but allowing escape of moisture.

C. Reference Standards:

1. ASTM International:
 - a. ASTM C62-10, 'Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale)'.
 - b. ASTM C67-12, 'Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile'.
 - c. ASTM C150/C150M-12, 'Standard Specification for Portland Cement'.
 - d. ASTM C216-11, 'Standard Specification for Facing Brick (Solid Masonry Made from Clay or Shale)'.
 - e. ASTM C270-12a, 'Standard Specification for Mortar for Unit Masonry'.
 - f. ASTM C476-10, 'Standard Specification for Grout for Masonry'.
 - g. ASTM C652-11, 'Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale)'.
 - h. ASTM C1232-12, 'Standard Terminology of Masonry'.
2. International Building Code (IBC):
 - a. Chapter 21, 'Masonry' for materials, design, construction and quality of masonry (2009).
3. Masonry Standards Joint Committee (MSJC) - The Masonry Society (TMS) / American Concrete Institute (ACI) / American Society of Civil Engineers (SEI/ASCE):
 - a. TMS 402-11/ACI 530-11/ASCE 5-11, 'Building Code Requirements and Specification for Masonry Structures and Commentary'.
 - b. TMS 602-11/ACI 530.1-11/ASCE 6-11, 'Specification for Masonry Structures and Commentary'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
1. Participate in pre-installation conference held jointly with other Division 04 'Masonry' specifications in this Project that require pre-installation conferences:
 2. Schedule pre-installation conference during construction of mockup panel.
 3. 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 protection requirements.
 - d. Review masonry cleaning requirements.
 - e. Review clean up requirements.

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.

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. Mockups:
1. Sample panel 4 feet (1.20 m) long by 3 feet (900 mm) high of proposed color range, texture, bond, mortar, and workmanship. Include mock-up framing and sheathing to show wall construction to be used on Project, including:
 - a. Anchor and tie systems.
 - b. Any specialty details, such as reveals, soldier courses, window details and etc.
 - c. Brick expansion joints if required on Project.
 - d. Flexible flashing and required components at foundation.
 - e. Seismic reinforcing.
 2. Sample panel(s) shall be constructed using 'production run' material to be used on Project unless otherwise approved in writing by Architect and/or Owner.
 3. Sample panel(s) to be used as standard of comparison for masonry work built of same material.
 4. Sample panel(s) shall remain at jobsite until all masonry is completed.
 5. Do not start work of this Section until Architect has accepted sample panel(s).

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.
- 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. Do not use cementitious materials that have become contaminated.
 - b. 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.
 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 material on planks clear of ground which may contain soluble salts and protect from damage, dirt, or disfigurement.
 - b. 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. Reinforcement:
 - a. Protect reinforcement, ties, and metal accessories from permanent distortions, elements and store off ground.

1.7 FIELD CONDITIONS

A. Ambient Conditions:

1. Cold Weather and Hot Weather Limitations:
 - a. Follow requirements of TMS 402/ACI 530/ASCE 5-11 and TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Design Criteria:

1. Face Brick: Meet requirements of ASTM C216 or CSA A82.
 - a. Grade SW.
 - b. 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: Type 'N' as specified in Section 04 0513.
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.
 - c. Quality Standard: Match existing brick on storage building.
 - d. Type One Acceptable Manufacturers, Style, And Color:
 - 1) Interstate Brick: 9780 South 5200 West, West Jordan, UT 84088, (801) 280-5234.
 - 2) Equal as approved by Architect before bidding. See Section 01 6200.

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. 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.

3.3 INSTALLATION

- A. General:
 - 1. Place masonry, mortar and grout in accordance with TMS 602/ACI 530.1/ASCE 6.
 - 2. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
 - 3. 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.
 - 4. Built-In Work:
 - a. As work progresses, install masonry flashings and weep holes and other built-in work specified in other sections.
- B. Special Techniques:
 - 1. General:
 - a. Comply with cold-weather and hot weather requirements contained in TMS 402/ACI 530/ASCE 5-11 and TMS 602/ACI 530.1/ASCE 6.
 - b. 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)**.
 - c. Cold weather:
 - 1) Do not lay masonry in Cold Weather unless authorized by Architect.
 - 2) Minimum temperature of units when laid: **20 deg F (minus 7 deg C)**.
 - 3) The following options may be used in cold weather construction:
 - a) Change to higher type of mortar required in ASTM C270 (Example: If ASTM type N mortar is specified for normal temperature, change to type S or type M.).
 - b) Increase the protection time where required for twenty four (24) hour to forty eight (48) hour with no change being made in the type of mortar.

- c) Without changing the mortar type and maintaining twenty four (24) hour protection, replace Type I portland cement in the mortar with type III, ASTM C150/C150M.
 - d) 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.
 - e) Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven (7) days after completing cleaning.
- d. Hot weather:
- 1) During hot weather, shading masonry materials and equipment reduces mortar and grout temperatures. Scheduling construction to avoid hotter periods of day should be considered.
 - 2) To improve flexural bond strength, sand piles should be kept cool and in damp, loose condition by sprinkling and by covering with plastic sheet to limit evaporation.
2. Cold Weather Requirements. Implement approved cold weather procedures and comply with following:
- a. Preparation requirements. Comply with following 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) 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.
 - b. Construction requirements. These requirements apply to work in progress and are based on ambient air temperature. Do not heat water or aggregates used in mortar or grout above 140 deg F (60 deg C). Comply with following requirements when following ambient air temperatures exist:
 - 1) Air temperature 40 deg F (4.4 deg C) to 32 deg F (0 deg C):
 - a) Heat sand or mixing water to produce mortar temperatures between 40 deg F (4.4 deg C) and 120 deg F (49 deg C) at time of mixing. Grout does not require heated materials, unless temperature of materials is below 32 deg F (0 deg C):
 - 2) Air temperature below 32 deg F (0 deg C) to 25 deg F (minus 3.9 deg C):
 - a) Heat sand and mixing water to produce mortar temperatures between 40 deg F (4.4 deg C) and 120 deg F (49 deg C) at time of mixing.
 - b) Maintain mortar temperature above freezing until used in masonry. Heat grout aggregates and mixing water to produce grout temperature between 70 deg F (21.1 deg C) and 120 deg F (49 deg C) at time of mixing. Maintain grout temperature above 70 deg F (21.1 deg C) at time of grout placement. Heat masonry units to minimum temperature of 40 deg F (4.4 deg C) before installing thin-bed mortar.
 - 3) Air temperatures below 25 deg F (minus 3.9 deg C) to 20 deg F (minus 7 deg C). Comply with the following:
 - a) Heat sand and mixing water to produce mortar temperatures between 40 deg F (4.4 deg C) and 120 deg F (49 deg C) at time of mixing.
 - b) Maintain mortar temperature above freezing until used in masonry. Heat grout aggregates and mixing water to produce grout temperature between 70 deg F (21.1 deg C) and 120 deg F (49 deg C) at time of mixing. Maintain grout temperature above 70 deg F (21.1 deg C) at time of grout placement. Heat masonry units to minimum temperature of 40 deg F (4.4 deg C) before installing thin-bed mortar.
 - c) Heat masonry surfaces under construction to 40 deg F (4.4 deg C) and use windbreaks or enclosures when wind is in excess of 15 mph (24 kph). Heat masonry to minimum of 40 deg F (4.4 deg C) prior to grouting.
 - 4) Air temperature below 20 deg F (minus 7 deg C). Comply with the following:
 - a) Heat sand and mixing water to produce mortar temperatures between 40 deg F (4.4 deg C) and 120 deg F (49 deg C) at time of mixing.
 - b) Maintain mortar temperature above freezing until used in masonry. Heat grout aggregates and mixing water to produce grout temperature between 70 deg F (21.1 deg C) and 120 deg F (49 deg C) at time of mixing. Maintain grout temperature above 70 deg F (21.1 deg C) at time of grout placement. Heat

- masonry units to minimum temperature of 40 deg F (4.4 deg C) before installing thin-bed mortar.
- c) Heat masonry surfaces under construction to 40 deg F (4.4 deg C) and use windbreaks or enclosures when wind is in excess of 15 mph (24 kph). Heat masonry to minimum of 40 deg F (4.4 deg C) prior to grouting.
 - d) Provide enclosures and auxiliary heat to maintain air temperature above 32 deg F (0 deg C) within enclosure.
- c. Protection: These requirements apply after masonry is place and are based on anticipated minimum daily temperature for grouted masonry and anticipated mean daily temperature for ungrouted masonry. Protect completed masonry in following manner:
- 1) Maintain temperature of masonry units above 32 deg F (0 deg C) for first four (4) hours after thin-bed mortar application.
 - 2) Mean daily air temperature 40 deg F (4.4 deg C) to 25 deg F (minus 3.9 deg C):
 - a) Protect masonry from rain or snow for twenty four (24) hour by covering with weather-resistive membrane.
 - 3) Mean daily air temperature below 25 deg F (minus 3.9 deg C) to 20 deg F (minus 7 deg C):
 - a) Completely cover masonry with insulating blankets or equal protection for twenty four (24) hours after completion of work. Extend time period to forty eight hours for grouted masonry, unless only cement in grout is Type III portland cement.
 - 4) Mean daily air temperature below 20 deg F (minus 7 deg C) and below:
 - a) Maintain newly constructed masonry temperature above 32 deg F (0 deg C) for at least twenty four (24) hours after being completed by using heated enclosures, electric heating blankets, infared lamps, or other acceptable methods. Extend time period to forty eight (48) hours for grouted masonry, unless only cement in grout is Type III portland cement.
3. Hot Weather Requirements. Implement approved hot weather procedures and comply with following:
- a. Preparation. Comply with following requirements prior to conducting masonry work:
 - 1) When 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):
 - a) Maintain sand piles in damp, loose condition.
 - b) Provide necessary conditions and equipment to produce mortar having a temperature below 120 deg F (49 deg C).
 - 2) When 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), implement following requirements:
 - a) Maintain sand piles in damp, loose condition.
 - b) Provide necessary conditions and equipment to produce mortar having a temperature below 120 deg F (49 deg C).
 - c) Shade materials and mixing equipment from direct sunlight.
 - b. Construction. While masonry work is in progress:
 - 1) When 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):
 - a) Maintain temperature of mortar and grout below 120 deg F (49 deg C).
 - b) Flush mixer, mortar transport container, and mortar boards with cool water before they come into contact with mortar ingredients or mortar.
 - c) Maintain mortar consistency by retempering with cool water.
 - d) Use mortar with two (2) hours of initial mixing.
 - e) Spread thin-bed mortar no more than 4 feet (1.20 m) ahead of masonry units.
 - f) Set masonry units within one (1) minute after spreading thin-bed mortar.
 - 2) When ambient temperature exceeds 115 deg F (46.1 deg C), or exceeds 105 deg F (40.6 deg C) with a wind velocity greater than 8 mph (12.9 kph), implement following requirements:
 - a) Maintain temperature of mortar and grout below 120 deg F (49 deg C).
 - b) Flush mixer, mortar transport container, and mortar boards with cool water before they come into contact with mortar ingredients or mortar.
 - c) Maintain mortar consistency by retempering with cool water.
 - d) Use mortar with two (2) hours of initial mixing.
 - e) Spread thin-bed mortar no more than 4 feet (1.20 m) ahead of masonry units.

- f) Set masonry units within one (1) minute after spreading thin-bed mortar.
 - g) Use cool mixing water for mortar and grout. Ice is permitted in mixing water prior to use. Do not permit ice in mixing water when added to other mortar or grout materials.
- 3) Protection:
- a) When 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):
 - (1) Fog spray newly constructed masonry until damp, at least three (3) times a day until masonry is three (3) days old.
4. Repair brick units and repoint mortar joints only when air temperature is between 40 deg F (4 deg C) and 90 deg F (32 deg C) and is predicted to remain so for at least seven (7) days after completion of the Work unless otherwise indicated.
- C. Interface With Other Work:
1. Make cuts proper size to accommodate work of other trades. Cut openings for electrical devices using cover plates no larger than can be covered by standard size plate.
 2. Replace unit masonry in which larger than necessary openings are cut. Do not patch openings with mortar or other material.
- 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. Masonry Veneer Ties:
1. Free of material that may destroy bond.
 2. Install as detailed by screwing through sheathing into framing. 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. Install final row of ties within 8 inches (200 mm) of top course of brick.
 3. 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.
- F. 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. Drip edge/plate: Install with sealant (or equal) between drip edge/plate and substrate.
 3. 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.

- G. Laying:
1. Layout:
 - a. Running bond except where noted otherwise. Select brick so there is uniform distribution of hues.
 - b. Use solid brick where brick coursing would otherwise show cores.
 2. Joints:
 - a. Do not tool until mortar has taken initial set.
 - b. Tool concave. When tooling joints, squeeze mortar back into joint.
 - c. Point holes in joints. Fill and tool properly.
 3. Use mortar within two (2) hours of initial mixing. Discard mortar that has begun to set.
 4. 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.
 5. Set masonry units within one minute of spreading mortar. Shove brick into place in full mortar bed, do not lay.
 6. Completely fill horizontal and vertical joints. Do not furrow bed joints.
 7. Strike back-side joints on brick flush. Do not allow mortar build-up in cavity between masonry veneer and stud wall sheathing.
 8. Step back unfinished work for joining with new work. Use toothing only with Architect's approval.
- 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.
- 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.

3.4 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
1. Remove and replace defective material at Architect's direction and at no additional cost to Owner.

3.5 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. Freezing:
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. Follow recommendations for cold weather of Masonry Standards Joint Committee (MSJC) - The Masonry Society (TMS) / American Concrete Institute (ACI) / American

Society of Civil Engineers (SEI/ASCE) TMS 402/ACI 530/ASCE 5-11 and TMS 602/ACI 530.1/ASCE 6.

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. Prevent staining of brick as outlined in Brick Industry Association Technical Notes on Brick Construction 23, 'Stains - Identification and Prevention'.
 2. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 3. Protect sills, ledges, and projections from mortar droppings.
 4. Protect surfaces of window and door frames, as well as similar products with pointed and integral finishes, from mortar droppings.
 5. Turn scaffold boards near wall on edge at end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

3.6 CLEANING

- A. General:
1. Clean brick as outlined in Brick Industry Association Technical Notes on Brick Construction 20, 'Cleaning Brickwork'.
 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.

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

05 5000 METAL FABRICATIONS

05 5215 STAINLESS STEEL HANDRAILS

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.
- B. Related Requirements:
 - 1. 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(2009), '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.

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.

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. Furnishing and installing of structural bolts specified under Section concerned.
 - 2. 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:2010, 'Structural Welding Code - Steel'.
 - b. ANSI/AWS D1.3/D1.3M:2010, 'Structural Welding Code - Sheet Steel'.
 - 2. ASTM International:
 - a. ASTM A36/A36M-08, 'Standard Specification for Carbon Structural Steel'.
 - b. ASTM A307-10, 'Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength'.
 - c. ASTM A325-10, 'Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength'.

1.3 QUALITY ASSURANCE

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

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

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

2.2 ACCESSORIES

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

PART 3 - EXECUTION**3.1 PERFORMANCE**

- A. Welding shall meet requirements of ANSI / AWS D1.1 and D1.3.
- B. Minimum weld sizes, unless detailed otherwise.
 - 1. Weld pipe columns to base plates and top plates with 1/4 inch (6 mm) fillet weld all around.
 - 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. Structural pipe for bollards.
- B. Related Requirements:
 - 1. Section 03 3053: Installation of bollards.
 - 2. Sections under 04 2000 heading: Installation of lintels, channel frames, and miscellaneous structural steel.
 - 3. Section 05 0503: Quality of priming.
 - 4. Section 05 0523: Quality of welding.
 - 5. Section 06 1100: Installation of miscellaneous structural steel.

1.2 REFERENCES

- A. Reference Standards:
 - 1. American Society For Testing And Materials:
 - a. ASTM A36/A36M-08, 'Standard Specification for Carbon Structural Steel'.
 - b. ASTM A53/A53M-12, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
 - c. ASTM A500/A500M-10a, '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 Pipe.
 - a. Meet requirements of ASTM A53/A53M, Type E or S, Grade B.
 - 1) Weight Class, STD, Schedule 40.
 - 2. Structural Tubing: Meet requirements of ASTM A500/A500M, Grade B.
 - 3. Miscellaneous Steel:
 - a. Meet requirements of ASTM A36/A36M for the following:
 - 1) Miscellaneous structural steel.
- B. Fabrication:
 - 1. After fabrication and before shop priming, hot-dip or mechanically galvanize lintels to be installed in following:
 - a. Exterior walls.
 - b. Bollards.
 - c. Satellite dish base.
 - 2. Shop prime steel provided under this Section.
- C. Finishes:
 - 1. Shop Primer:
 - a. Concealed Steel: Fabricator's standard shop coat.
 - b. Exposed Steel To Receive Finish: Primer shall be acceptable to Finish Manufacturer.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 05 5215**STAINLESS STEEL HANDRAILS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install stainless steel pipe handrails as described in Contract Documents.
- B. Products Furnished But Not Installed Under This Section:
 - 1. Anchoring sleeves in concrete for stainless steel pipe handrails.
- C. Related Requirements:
 - 1. Section 03 3111: 'Normal-Weight Structural Concrete' for installation of anchoring sleeves cast into concrete.
 - 2. Section 05 0523: 'Metal Fastening' for quality of welding.

1.2 REFERENCES

- A. Definitions:
 - 1. Non-magnetic Stainless Steel: Austenitic grade of stainless steel with low magnetic permeabilities and shows almost no response to a magnet when in annealed condition.
 - 2. Non-shrink Grout: Structural grout used for filling voids between elements that is formulated with cement, fine aggregates and admixtures. Admixtures are used to provide expansive properties of the material during curing. This expansion counteracts the natural tendency of cement grouts to shrink during curing.
 - 3. Peened: Nonslip textured gripping surface that is much easier to hold on to.
 - 4. Stainless Steel: Stainless steels are alloys of iron to which at least 10 percent chromium has been added to increase corrosion resistance and will not rust when exposed to weather. To obtain greater corrosion resistance, more nickel and chromium are added to the alloy. Along with iron and chromium, all stainless steels contain some carbon to make it stronger.
 - a. Austenitic Stainless Steel: Most popular of the stainless steels because of their ductility, ease of working and good corrosion resistance.
 - b. Stainless Steel Alloys:
 - 1) Type 304 (UNS S30400): Austenitic stainless steel with non-magnetic properties in annealed condition that provide good corrosion resistance to both chemical and atmospheric exposures, with high resistance to oxidations. Most common and widely used stainless steel.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C1107/C1107M-13, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)'.

1.3 SUBMITTALS

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

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Materials:

1. Handrails And Railings:
 - a. 1-1/2 inch (38 mm) outside diameter non-magnetic satin finish 16 gauge (0.063) (1.6002 mm) type 304 stainless tubing.
 - b. Sizes and configurations as indicated on Contract Drawings.
2. Pipe Sleeves: 2 inch (50 mm) diameter by 6 to 9 inch (150 to 225 mm) long non-magnetic stainless steel.

B. Fabrication:

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

2.2 ACCESSORIES

A. Rail Setting Grout:

1. Commercial non-shrink grout conforming to requirements of ASTM C1107, Type B or Type C.
2. Type Two Acceptable Manufacturers:
 - a. Normal Construction Grout A by Bonsal American, Charlotte, NC www.bonsal.com.
 - b. Advantage 1107 Grout by Dayton Superior Specialty Chemicals, Kansas City, KS www.daytonsuperiorchemical.com.
 - c. NS Grout by Euclid Chemical Co, Cleveland, OH www.euclidchemical.com
 - d. 5 Star Special Grout 110 by Five Star Products Inc, Fairfield, CT www.fivestarprouducts.com.
 - e. Duragrout by L&M Construction Chemicals Inc, Omaha, NE www.lmcc.com.
 - f. Sonneborn / BASF Building Systems, Shakopee, MN www.chemrex.com.
 - g. Tamms Grout 621 by TAMMS Industries, Mentor, OH www.tamms.com.
 - h. U S Spec MP Grout by U S Mix Products Co, Denver, CO www.usspec.com.
 - i. CG-86 Grout by W R Meadows, Hampshire, IL www.wrmeadows.com.
 - j. Equal as approved by Architect before use. See Section 01 6200.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coring of concrete for installation of balusters is acceptable.
- B. Touch up field welds to match finished material.

END OF SECTION

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DIVISION 06: WOOD, PLASTICS, AND COMPOSITES

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

06 0573 PRESERVATIVE WOOD TREATMENT

06 1000 ROUGH CARPENTRY

06 1011 WOOD FASTENINGS

06 1100 WOOD FRAMING

06 1636 WOOD PANEL PRODUCT SHEATHING

06 1753 SHOP-FABRICATED WOOD TRUSSES: TRUSSED RAFTERS

06 2000 FINISH CARPENTRY

06 2024 DOOR, FRAME, AND FINISH HARDWARE INSTALLATION

END OF TABLE OF CONTENTS

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

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

1.2 REFERENCES

- A. Definitions:
 - 1. Preservative-Treated Wood: Wood exposed to high levels of moisture or heat susceptible to decay by fungus and other organisms, and to insect attack. The damage caused by decay or insects can jeopardize the performance of the wood members so as to reduce the performance below that required. Preservative treatment requires pressure-treatment process to achieve depth of penetration of preservative into wood to verify that the wood will be resistant to decay and insects over time.
 - 2. Treated Wood: Wood impregnated under pressure with compounds that reduce its susceptibility to flame spread or to deterioration caused by fungi, insects, or marine bores.
- B. Reference Standards:
 - 1. American Wood Protection Association:
 - a. AWPA P5-10. 'Standard For Waterborne Preservatives'.
 - b. AWPA P22-10. 'Standard For Ammoniacal Copper Zinc Arsenate (ACZA)'.
 - c. AWPA P51-10, 'Standard for Zinc Borate (ZB)'.
 - d. AWPA T1-12, 'Use Category System: Processing and Treatment Standard For Treated Wood'.
 - e. AWPA U1-12, 'Use Category System: User Specification For Treated Wood'.
 - 2. International Building Code (IBC):
 - 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)**.
 - 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: Quality of Anchors and Inserts.
 - 2. Section 05 0523: 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. APA-The Engineered Wood Association:
 - a. APA AFG-01: Adhesives for Field-Gluing Plywood to Wood Framing (September 1974).
 - 2. ASTM International:
 - a. ASTM A153/A153M-09, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
 - b. ASTM D3498-03(2011), 'Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems'.
 - c. ASTM F1667-11a, 'Standard Specification for Driven Fasteners: Nails, Spikes, and Staples'.

1.3 SUBMITTALS

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

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Description:
 - 1. Nail Terminology:

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

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

B. Materials:

1. Fasteners:

a. General:

- 1) Fasteners for preservative treated and fire-retardant-treated wood shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronzed, or copper. Coating weights for zinc-coated fasteners shall be in accordance with ASTM A153/A153M.

b. Nails:

- 1) Meet requirements of ASTM F1667.
 2) Unless noted otherwise, nails listed on Drawings or in Specifications shall be common nail diameter, except 16d nails, which shall be box diameter.

c. Wood Screws:

1) SDS Screws:

- a) Category Four Approved Products. See Section 01 6200 for definitions of categories.
 (1) SDS Screws by Simpson Strong Tie Co, Dublin, CA www.strongtie.com.

- 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.

2. Adhesives:

a. Construction Mastics:

- 1) Meet requirements of 'APA-The Engineered Wood Association' Specification AFG-01 or ASTM D3498.
 2) Use phenol-resorcinol type for use on pressure treated wood products.

3. Framing Anchors:

- a. Framing anchors and associated fasteners in contact with preservative hot dipped zinc-coated galvanized steel or stainless steel. Do not use stainless steel items with galvanized items.

b. Type Two Acceptable Products:

- 1) KC Metals Inc, San Jose, CA www.kcmetals.com.
 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. Wood panel product sheathing.
 - 4. Wood trusses.
- 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'.
 - a. Pre-installation conference held jointly with Section 06 1100.
 - 4. Section 06 1712: 'Structural Composite Lumber - SCL'.
 - 5. Section 06 1753: 'Shop Fabricated Wood Trusses'.
 - 6. Sections in Division 07: Roofing membranes for related blocking, wood nailers, and curbs.

1.2 REFERENCES

- A. Reference Standards:
 - 1. National Institute of Standards and Technology (NIST), Technology Administration, U. S. Department of Commerce:
 - a. Voluntary Product Standard DOC PS 20-05, 'American Softwood Lumber Standard'.
 - 2. Truss Plate Institute / Wood Truss Council of America:
 - a. TPI / WTCA Building Component Safety Information BCSI 2008, 'Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in pre-installation conference held jointly with Section 06 1636.
 - a. Schedule pre-installation conference immediately before beginning framing work.
 - b. In addition to agenda items specified in Section 01 3100, review following:
 - 1) Blocking in wood framed walls.
 - 2) Rough opening.
 - 3) Shear walls.
 - 4) Nails and nailing requirements.
 - 5) Truss installation.
 - 6) 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.
2. Manufacturer Instructions:
 - a. Copies of pamphlets specified in REFERENCE Article. After Architect's examination, keep pamphlets on Project site with approved shop drawings. Pamphlets may be obtained from Truss Plate Institute, Wood Truss Council of America, or from Truss Fabricator.

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.
 3. Handle and store wood trusses in accordance with ANSI / WTCA Booklet BSCI except trusses may be unloaded by dumping if trusses are shipped horizontally, are rolled off low profile roller bed trailer, and no part of any truss is required to drop more than **18 inches (450 mm)**.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Dimension Lumber:
 1. Design Criteria:
 - a. Meet requirements of PS 20 and National Grading Rules for softwood dimension lumber.
 - b. Bear grade stamp of WWPA, SPIB, or other association recognized by American Lumber Standards Committee identifying species of lumber by grade mark or by Certificate of Inspection.
 - c. Lumber **2 inches (50 mm)** or less in nominal thickness shall not exceed 19 percent in moisture content at time of fabrication and installation and be stamped 'S-DRY', 'K-D', or 'MC15'.
 - d. Lumber shall be S4S.
 - e. Preservative Treated Plates / Sills:
 - 1) **2x4 (38 mm by 64 mm)**: Standard and better Douglas Fir, Southern Pine, or HemFir, or StrandGuard by iLevel by Weyerhaeuser Boise, ID www.ilevel.com. (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 drawings for additional requirements.

2.2 ACCESSORIES

- A. Folding Partition Headers:

1. New, unused plywood conforming to plywood specification requirements of Section 06 1636.
- B. Blocking:
 1. Sound lumber without splits, warps, wane, loose knots, or knots larger than **1/2 inch (13 mm)**.
- C. Furring Strips:
 1. Utility or better.
- D. 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. Ends Of Stud Wall 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. 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.
6. Nailing:
- a. Stud to plate:

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 Wood Trusses:
 - a. Handle, erect, and brace wood trusses in accordance with TPI / WTCA Booklet BCSI.
 - b. Do not install damaged or broken wood trusses. Replace wood trusses that are broken, damaged, or have had members cut out during course of construction.
 - c. Provide construction bracing for trusses in accordance with TPI DSB-89.
 - d. Provide continuous 2x4 horizontal web bracing as shown on truss shop drawings.
 - 1) Secure bracing to each truss with two 10d or 16d nails.
 - 2) Lap splice bracing by placing bracing members side by side on common web member. Butt splices are not acceptable.
 - e. Unless directed or shown otherwise, provide diagonal 2x4 bracing between trusses at each line of horizontal web bracing.
 - 1) This diagonal bracing shall be continuous and extend from junction of web and top chord of one truss to junction of web and bottom chord of different truss.
 - 2) Install bracing at approximately 45 degree angle. Bracing will extend over three trusses minimum or more as determined by height of trusses and 45 degree installation angle.
 - 3) Install brace on side of web opposite horizontal web bracing and nail to each web with two 10d or 16d nails.
 - 4) Install one brace every 20 feet as measured from top of brace to top of next brace.
 5. 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.
 6. Installation of wood Web Joists:
 - a. Handle, erect, and brace plywood web joists in accordance with Manufacturer's instructions.
 - b. Do not install damaged or broken wood web joists.
 - c. Install temporary horizontal and cross bracing to hold members plumb and in safe condition until permanent bracing is installed.

- d. Cut holes through webs at locations or of sizes shown on Drawings and as recommended by Manufacturer.

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 as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 01 0000: 'General Requirements':
 - a. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - b. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - c. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - d. Section 01 6200: Administrative and procedural requirements for product options.
 - 2. Section 06 1100: 'Wood Framing':
 - a. Pre-installation conference held jointly with Section 06 1636.

1.2 REFERENCES

- A. Association Publications:
 - 1. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15th St., NW, Washington, DC 20005; 202-347-7474; www.acec.org).
- B. Definitions:
 - 1. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.
 - 2. Inspection/Special Inspection: Inspection of materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards:
 - a. Inspection: Not required by code provisions but may be required by Contract Documents.
 - b. Special Inspection: Required by code provisions and by Contract Documents.
 - c. Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
 - d. Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.
 - 3. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform particular construction operation, including installation, erection, application, and similar operations.
 - 4. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
 - 5. Owner's Representative: Owner's Designated Representative (Project Manager or Facilities Manager) who will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.
 - 6. Product Testing: Tests and inspections that are performed by testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

7. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
 8. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
 9. Special Inspection: See Inspection.
 10. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
 11. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.
- C. Reference Standards:
1. National Institute of Standards and Technology (NIST), Technology Administration, U. S. Department of Commerce:
 - a. Voluntary Product Standard DOC PS 1-07. 'Structural Plywood'.
 - b. Voluntary Product Standard DOC PS 2-04, 'Performance Standard for Wood-based Structural-Use Panels'.
 2. International Code Council (IBC) (2012):
 - a. IBC Chapter 17, 'Special Inspections And Tests'.
 - 1) Section 1704, 'Special Inspections, Contractor Responsibility And Structural Observations'.
 - 2) Section 1705, 'Required Verification And Inspection'.
 - a) Section 1705.5, 'Wood Construction'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
1. Participate in pre-installation conference as specified in Section 06 1100.

1.4 SUBMITTALS

- A. Informational Submittals:
1. Qualification Statement:
 - a. Alternate Supplier: See Section 01 4301 for supplier qualifications.
 - 1) Provide documentation of the following:
 - a) Firm experience in supplying products indicated for this Project.
 - b) Financial stability.
 - c) Sufficient production capacity to produce required units.
 - d) Comply with specifications and contract documents.
 - e) Agree to complete reporting documents, including:
 - (1) Agree to provide total costs to the Church including breakdown costs of dimensional lumber, structural composite lumber, wood panel product-sheathing, wood 'I' joists and glued-laminated members.

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 MANUFACTURED UNITS

A. Performance:

1. Design Criteria:

- a. Meet requirements of PS 1, PS 2, PRP-108 (APA), or PRP-133 (TECO). Except where plywood is specifically indicated on Drawings, oriented strand board (OSB) is acceptable.

B. Materials:

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	9.5 mm	24 / 0
7/16 inch nominal	11 mm nominal	24 / 16
15/32 inch actual	11.9 mm actual	32 / 16
1/2 inch nominal	12.5 mm nominal	32 / 16
19/32 inch actual	15.1 mm actual	40 / 20
5/8 inch nominal	15.9 mm nominal	40 / 20
23/32 inch actual	18.3 mm actual	48 / 24
3/4 inch nominal	19 mm nominal	48 / 24

2.2 ACCESSORIES

A. Nails:

1. As indicated on 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 Drawings.
 - b. Place nails not less than **3/8 inch (9.5 mm)** in from edge.
4. Thickness:
 - a. As indicated on 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. Nail Spacing:
 - a. As indicated on Drawings.
 - b. Place nails at least **3/8 inch (9.5 mm)** in from edge.
 3. Thickness:
 - a. As indicated on Drawings.
 4. 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. Wood Sheathing:
 - a. For walls and roof areas where nail spacing is **4 inches (100 mm)** and less on center, the 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 1753**SHOP-FABRICATED WOOD TRUSSES: Trussed Rafters****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Supplied But Not Installed Under This Section:
 - 1. Wood roof trusses.
- B. Related Requirements:
 - 1. Section 01 0000: 'General Requirements':
 - a. Section 01 1200: Multiple contracts.
 - b. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - c. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - d. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 2. Section 06 1100: 'Wood Framing':
 - a. Storage and handling of trusses on Project site.
 - b. Installing, securing, bracing, etc.

1.2 REFERENCES

- A. Association Publications:
 - 1. International Standards Organization (ISO) / International Electrotechnical Commission (IEC):
 - a. ISO/IEC 17020-1998, 'General criteria for the operation of various types of bodies performing inspection'.
 - 2. Structural Building Components Association (SBCA) www.sbcindustry.com.
 - 3. Truss Plate Institute (TPI):
 - a. DSB-89, 'Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses'.
 - 4. Truss Plate Institute (TPI) / Structural Building Components Association (SBCA):
 - a. TPI/SBCA Structural Building Components Association Components Safety Information BCSI 2008, 'Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses'.
- B. Definitions:
 - 1. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.
- C. Reference Standards:
 - 1. American National Standards Institute (ANSI) / Truss Plate Institute (TPI):
 - a. ANSI/TPI 1-2007, 'National Design Standard for Metal Plate Connected Wood Truss Construction'.
 - 2. ASTM International:
 - a. ASTM A641-09a/A641M-09a, 'Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire'.
 - 3. International Code Council (ICC):
 - a. ICC / ESR-1082 (Reissued February 1, 2010), 'Eagle Metal Products Eagle 20, Eagle 18, Eagle 20HS and Eagle 18HS Metal Truss Connector Plates'.
 - b. ICC / ESR-1118 (Reissued January 1, 2011), 'Alpine Wave, H, S, K, Trulox, and Hinge Plate Metal Connector Plates for Wood Trusses'.

- c. ICC / ESR-1988 (Reissued December 1, 2010), 'MiTek Truss Connector Plates: TL18, MT18, MT18HS, TL20 AND MT20'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing:
 1. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work follow erection of trusses.

1.4 SUBMITTALS

- A. Action Submittals:
 1. Shop Drawings:
 - a. Truss design drawings:
 - 1) Base truss design drawings on truss configurations and truss loads and requirements of Contract Documents. Joint configurations may be modified to allow double cut webs. Determine member forces from exact analysis method as defined by TPI.
 - 2) Include following information:
 - a) Allowable loads in lbs per effective nail or lbs per sq inch for lumber and plates used as allowed by ICBO and current ICBO report number.
 - b) Stress reduction factors used for plates and lumber.
 - c) Top and bottom chord design loads in psf.
 - d) Size, thickness, and exact location by dimension of plates.
 - e) Lumber species and grades used.
 - f) Combine stress index for each member.
 - g) Stamp and signature of Engineer responsible for preparation of drawings.
 - h) Name and trademark of Plate Manufacturer if metal plates are used.
 - i) Name and address of Truss Fabricator and Project name and address.
- B. Informational Submittals:
 1. Certificates:
 - a. Complete and provide copy of certification "Truss Plant Certification Requirements Form" to Architect before bid.
 - b. Provide attachment copy of truss plant certification with completed "Truss Plant Certification Requirements Form" to Architect and Testing Agency before commencing fabrication of Wood Trusses.
 2. Test And Evaluation Reports:
 - a. Copies of previous four quarterly inspection reports verifying compliance with TPI regulations unless the Truss Fabricator provides proof that they are certified and in good standing with the In-Plant WTCA QC program certification.

1.5 QUALITY ASSURANCE

- A. Qualifications. Requirements of Section 01 4301 applies, but is not limited to the following:
 1. Metal Connector-Plate Manufacturer Qualifications:
 - a. Member of TPI and complies with quality-control procedures in TPI 1 for manufacturer of connector plates.
 - 1) Fabricator's responsibility include providing professional engineering services needed to assume engineering responsibility.
 - 2) Engineering responsibility: Preparation of shop drawings and comprehensive engineering analysis by qualified professional engineer registered in location of jurisdiction.
 2. Fabricator Qualifications:
 - a. Fabricator must have a letter providing evidence that they are certified and in good standing with their third party accredited Quality Assurance business.

- b. Fabricator shall have in place a program requiring fabrication plant to be inspected four times each year by an independent testing laboratory in accordance with TPI regulations.

1.6 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
 - 1. Notify Architect two (2) days minimum before arrival of trusses to allow for scheduling of truss inspection on site before unloading and for monitoring of unloading procedure.
 - 2. Unload trusses by one of following methods.
 - a. As outlined in TPI / SBCA Booklet BCSI, 'Guide to Good Practice For Handling, Installing & Bracing of Metal Plate Connected Wood Trusses'.
 - b. Trusses may be unloaded by dumping if trusses are shipped horizontally, are rolled off low profile roller bed trailer, and if no part of any truss is required to drop more than **18 inches (450 mm)**.
 - 3. After delivery of trusses:
 - a. Inspect for damage before installing trusses.
 - b. Inspect for "gaps" between framing members.
 - c. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Wood Truss Fabricators:
 - 1. Type Two Acceptable Fabricator:
 - a. Meet following requirements:
 - 1) Wood Truss fabricator whose products meet quality requirements of this Section.
 - 2) Wood Truss fabricator shall be certified and submit copy of the truss plant certification with 'Truss Plant Certification Requirements Form' the Architect and Testing Agency before commencing fabrication of Wood Trusses.

2.2 MANUFACTURED UNITS

- A. Performance:
 - 1. Design Criteria:
 - a. Top And Bottom Chords And Web Members:
 - 1) **2 inch (50 mm)** by **4 inch (100 mm)** nominal minimum size unless noted otherwise by Contract Documents.
 - 2) Sizes, species, and grades of members shall be as required to provide combined stress indexes of less than one.
 - 3) Designed in accordance with ANSI/TPI 1 for given design loads.
 - 4) Of quality to meet or exceed stress grade requirements given in table below for each lumber classification and to meet requirements for dimension lumber in Section 06 1100. Truss members not called out on Drawings shall meet or exceed stresses of classification C.
 - a) Of quality to meet minimum stress grade requirements given below:

	Class A, 2x6	Class B, 2x6	Class C, 2x4	Class C, 2x6
Fb Bending	1720	1495	1510	1310
Ft Tension	1010	880	825	725
Fv Shear	75	75	75	75

Fc Perpendicular	405	405	405	405
Fc Parallel	1650	1485	1495	1430
E	1.6×10^6	1.5×10^6	1.5×10^6	1.5×10^6

- b) Allowable stresses shown are for normal duration of load and repetitive member use.
- c) Following machine stress rated lumbers may be substituted for the above lumbers provided the combined stress ratio for each member is less than 1.0 by National Design Specification for Wood formulas, 2001. Total load deflection is less than $L/240$ and live load deflection is less than $L/360$.

$$\frac{A}{2100f} - 1.8E \quad \frac{B}{1800f} - 1.6E \quad \frac{C}{1650f} - 1.5E$$

- b. Metal Gusset Plates:
 - 1) Plate design and manufacture shall be as approved by 'The Research Committee for the ICC'.
 - 2) Truss plates for symmetrical trusses shall be same size on both sides of truss. Determine size to be used by highest loading value on either side of truss.
- B. Materials:
- 1. Top And Bottom Chords And Web Members: Douglas Fir or Southern Pine No. 2 or better.
 - 2. Metal Gusset Plates:
 - a. Connector plates to comply with TPI 1 from hot-dip galvanized steel sheet complying with ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than **0.036 inch (0.914 mm)** thick.
 - 1) Use for interior locations.
 - b. Manufacturer's name or trademark shall be visible on plates.
 - c. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - 1) Eagle Metal Products, Dallas, TX www.eaglemetal.com.
 - 2) ITW Building Components Group, Glenview, IL www.itwbcbg.com.
 - 3) MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc. Chesterfield, MO www.mii.com or MiTek Canada, Bradford ON www.mii.com/canada.
 - 4) Simpson AS Truss Connector Plates; Simpson Strong-Tie Company Inc. Pleasanton, CA www.strongtie.com.
- C. Fabrication:
- 1. General:
 - a. Fabrication of trusses shall be as approved by ICC except that this Specification shall govern when it exceeds ICC requirements.
 - b. Fabricate trusses from approved shop drawings.
 - c. Fabricate trusses in jigs with members accurately cut to provide good bearing at joints. Joints shall be acceptable if the average opening between ends of members immediately after fabrication is less than **1/16 inch (1.6 mm)**.
 - d. Each chord section shall be involved in two (2) panel points before being spliced.
 - 2. Metal Gusset Plates:
 - a. No panel point shall have more than one (1) plate per truss side.
 - b. Plates shall have minimum bite of **2-1/2 inches (63 mm)** on members. Measure bite along center line of webs and perpendicular to chord axes. Orient plate axis parallel with truss chord axis except where chords change pitch or terminate. Plates may be placed parallel with webs at single web joints.
 - 1) Minimum bite requirements are waived for non-structural webs parallel to top chords added for insulation backing and for other non structural members.
 - 2) Minimum bite requirements are waived for truss blocking.
 - c. Plate Sizes:
 - 1) Minimum width of plates shall be **3 inches (75 mm)**.

- a) Minimum bite requirements are waived for non-structural webs parallel to top chords added for insulation backing.
- b) Minimum width requirements are waived for truss blocking.
- 2) Size plates, nail and steel section for 110 percent of member forces.
- 3) No increase in plate values will be allowed for duration of loading or other factors.
- d. Press plates into members to obtain full penetration without crushing outer surface of wood. Plate embedment is acceptable if opening between plate and wood surface is less than $1/32$ inch (1 mm).
- e. Lumber defects and plate misplacement, in combination, shall not reduce plate area or number of effective teeth, prongs, or nails by more than ten percent.
- f. Do not apply metal gusset plates after shop fabrication.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Prefabricated Metal Plate Wood Trusses:

- a. Testing Agency will obtain "Truss Plant Certification Requirements Form" attachment copy from Architect as per requirements of Section 06 1753 Shop-Fabricated Wood Trusses: Trusses Rafters.
- b. Where truss clear span is 60 feet (18.3 meters) or greater, Inspector shall verify that temporary installation restraint/bracing and permanent individual truss member restraint/bracing are installed in accordance with approved truss submittal package.

END OF SECTION

ATTACHMENTS

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Truss Plant Certification Requirements Form

Wood Truss suppliers shall be certified as evidenced by submittal of a copy of the truss plant certification with this completed form to the Architect and Testing Agency before commencing fabrication of Wood Trusses.

Metal Plate Connected (MPC) wood truss operations must design, manufacture and provide quality control and quality audits that comply with the latest edition of ANSI/TPI-1 promulgated by the Truss Plate Institute.

The truss plant must be certified by an independent third party accredited Quality Assurance business such as, but not limited to, the Truss Plate Institute (TPI); the Southern Pine Inspection Bureau, the Timber Products Inspection Bureau or the PFS Corp. The third party accredited Quality Assurance business must be under the auspices of the International Accreditation Services (IAS) or the American National Standards Institute (ANSI) and be ISO/IES Standard 17020 compliant. The inspection/audit process is to be completely independent of the truss manufacturer.

Truss plant shall fulfill the following requirements (see www.sbcindustry.com and www.tpinst.org or www.tpic.ca):

- _____ Shall have an independent and accredited third party inspection agency (Quality Assurance business) staff member visit the truss plant for the certification, and shall have at least one inspection done quarterly by an independent third party inspection agency that is itself certified.
- _____ Shall meet all necessary in-plant requirements including: The Acceptance Criteria for Quality Documentation (ICC AC-10) by the ICC Evaluation Service, Inc. which shall include the quality control requirements of the Product Standard of ANSI / TPI. Meeting the ANSI / TPI standard includes having an in-plant quality control manual, quality control procedures in place, and meeting the weekly inspection frequency.
- _____ Do inspections at the required frequency and of the type established by the certification program. Specifically as a minimum, three trusses per set up location per shift per week.
- _____ Not manufacture trusses or use components that do not comply with the requirements of this form and of the Contract Documents.
- _____ Provide proof of compliance to the requirements of this form and provide the proof to the General Contractor who will forward it to the Architect prior to the truss plant providing a bid.

OR

Truss plant shall be certified and be in good standing with the In-Plant WTCA QC program. This includes the following requirements (see www.sbcindustry.com and www.tpinst.org or www.tpic.ca):

- _____ Truss plant has been trained by SBCA on the ANSI/TPI 1 QC standard.
- _____ Truss plant has quarterly third party inspections, and that the third party has been trained by SBCA.
- _____ Truss plant has quality control manual that meets the AC-10 requirements.
- _____ Truss plant has quality control procedures in place including: meeting the weekly inspection frequency, performing detailed inspections, and documenting any inspection problems and how they were resolved.
- _____ Truss plant is sending their data quarterly to SBCA for review.
- _____ Truss plant shall not manufacture trusses or use components that do not comply with the requirements of this form and of the Contract Documents.

In-Plant WTCA QC certified plants are listed at www.sbcindustry.com/wtcaqccertco.php.

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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.
- B. Products Installed But Not Furnished Under This Section:
 - 1. Hollow metal doors.
 - 2. Hollow metal door frames.
 - 3. Finish hardware.
- C. Related Requirements:
 - 1. Section 07 9213: Quality of sealants.
 - 2. Sections under 08 1000 heading: Furnishing of doors and metal frames.
 - 3. Sections under 08 7000 heading: Furnishing of finish hardware.

1.2 REFERENCES

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

1.3 ADMINISTRATIVE REQUIREMENTS

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

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:

1. Fire door installations shall meet code requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Metal Frames:
 - a. Examine door frames and note damage upon acceptance.

B. Storage And Handling Requirements:

1. 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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DIVISION 07: THERMAL AND MOISTURE PROTECTION

07 1000 DAMPPROOFING AND WATERPROOFING

07 1113 BITUMINOUS DAMPPROOFING

07 3000 STEEP SLOPE ROOFING

07 3113 ASPHALT SHINGLES

07 4000 ROOFING AND SIDING PANELS

07 4616 ALUMINUM SIDING

07 6000 FLASHING AND SHEET METAL

07 6240 ALUMINUM FLASHING AND TRIM

07 6310 STEEP SLOPE ROOF FLASHING

07 6312 PERFORATED METAL SOFFIT

07 6321 ALUMINUM FASCIA

07 7000 ROOF AND WALL SPECIALTIES AND ACCESSORIES

07 7123 MANUFACTURED GUTTERS AND DOWNSPOUTS

07 9000 JOINT PROTECTION

07 9213 ELASTOMERIC JOINT SEALANTS

END OF TABLE OF CONTENTS

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SECTION 07 1113**BITUMINOUS DAMPPROOFING****PART 1 - GENERAL****1.1 SUMMARY**

A. Includes But Not Limited To:

1. Furnish and apply bituminous dampproofing to exterior foundation walls and top of footings as described in Contract Documents.

1.2 SUBMITTALS

A. Action Submittals:

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

1.3 DELIVERY, STORAGE, AND HANDLING

A. Storage And Handling Requirements:

1. Maintain dampproofing at **40 deg F (4 deg C)** or above before application.

1.4 FIELD CONDITIONS

A. Ambient Conditions:

1. Do not apply when ambient temperature is below **40 deg F (4 deg C)**, surface temperature is below **33 deg F (one deg C)**, or when rain is expected before applied dampproofing will dry.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

A. Bituminous Dampproofing:

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

PART 3 - EXECUTION**3.1 APPLICATION**

A. Spray Application:

1. Spray to a thickness of **10 mils (0.254 mm)** minimum.

B. Brush / Roller Application:

1. Apply two coats of dampproofing at rate recommended by Manufacturer.
 2. Apply coats in cross hatch method so coats are applied perpendicular to each other.
 3. Before applying second coat allow first coat to dry in accordance with Manufacturer's recommendations.
- C. Apply dampproofing to cover area from **6 inches (150 mm)** below finish grade line down to and including top of footings.
- D. Do not backfill against bituminous dampproofing for twenty four (24) hours after application.

END OF SECTION

SECTION 07 3113**ASPHALT SHINGLES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install Asphalt Shingle Roofing System as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
 - 1. Miscellaneous flashing and sheet metal.
 - a. Drip metal.
 - b. Gutters.
- C. Related Requirements:
 - 1. Section 07 6240: 'Aluminum Flashing and Trim'
 - 2. Section 07 6310: 'Steep Slope Roof Flashing: Asphalt Tile' for furnishing of roof flashing, pipe jacks, drip edge and miscellaneous flashing and sheet metal.
 - 3. Section 07 7123: 'Manufactured Gutters and Downspouts'

1.2 REFERENCES

- A. Definitions:
 - 1. Flame Spread Classification: Categories as per ASTM E84/UL 723 or ULC 102:
 - a. Class A: Highest fire-resistance rating for roofing as per ASTM E108. Indicated roofing is able to withstand severe exposure to fire exposure to fire originating from sources outside building.
 - b. Class B: Fire-resistance rating indicating roofing materials are able to withstand moderate exposure to fire originating from sources outside of building.
 - c. Class C: Fire-resistance rating indicating roofing materials are able to withstand light exposure to fire originating from sources outside of building.
 - 2. Life Safety Code Classes (NFPA 101):
 - a. Class A: rating 0-25.
 - b. Class B: rating 26-75.
 - c. Class C: rating 76-200.
 - d. Class D: rating 201-500.
 - e. Class E: rating over 500.
 - 3. Shiner: Incorrectly placed nail which isn't covered by subsequent course of shingles.
 - 4. Wind Uplift: Wind-induced forces on roof system or components in roof system. Wind uplift generally includes negative pressure component caused by wind being deflected around and across surfaces of building and positive pressure component from air flow beneath roof deck.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM D226-09/D226M-09, 'Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing'.
 - b. ASTM D228/D228M-15, 'Standard Test Methods for Sampling, Testing, and Analysis of Asphalt Roll Roofing, Cap Sheets, and Shingles Used in Roofing and Waterproofing'.
 - c. ASTM D1970/D1970M-15a, 'Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection'.
 - d. ASTM D2626-04(2012), 'Standard Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing'.
 - e. ASTM D3018/D3018M-11, 'Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules'.

- f. ASTM D3019-08, 'Standard Specification for Lap Cement Used with Asphalt Roll Roofing, Non-Fibered, Asbestos-Fibered, and Non-Asbestos-Fibered'.
- g. ASTM D3161/D3161M-16, 'Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method)'.
- h. ASTM D3462/D3462M-16, 'Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules'.
- i. ASTM D4869/D4869M-16a, 'Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing'.
- j. ASTM D6757-16a, 'Standard Specification for Underlayment Felt Containing Inorganic Fibers Used in Steep-Slope Roofing'.
- k. ASTM D7158/D7158M-16, 'Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method)'.
- l. ASTM E84-16, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
- m. ASTM E108-11, 'Standard Test Methods for Fire Tests of Roof Coverings'.
- n. ASTM F1667-15, 'Standard Specification for Driven Fasteners: Nails, Spikes, and Staples'.
2. International Building Code (IBC):
 - a. Chapter 15, 'Roof Assemblies And Rooftop Structures':
 - 1) Section 1507, 'Requirements for Roof Coverings':
 - a) 1507.2, 'Asphalt Shingles'.
3. National Fire Protection Association:
 - a. NFPA 101: 'Life Safety Code' (2015 Edition or most recent edition adopted by AHJ).
4. Underwriters Laboratories (UL):
 - a. UL 580: 'Tests for Uplift Resistance of Roof Assemblies' (5th Edition).
 - b. UL 723, 'Tests for Safety Test for Surface Burning Characteristics of Building Materials' (10th Edition).
 - c. UL 790, 'Standard Test Methods for Fire Tests of Roof Coverings' (8th Edition).
 - d. UL 2218, 'Standard for Impact Resistance of Prepared Roof Covering Materials' (2nd Edition).
 - e. UL 2390, 'Standard for Tests for Wind Resistant Asphalt Shingles with Sealed Tabs' (1st Edition).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 1. Participate in mandatory pre-installation conference:
 - a. Roofing Installer's Foreman and those responsible for installation of roofing to be in attendance. Include Shingle Manufacturer's Representative if available.
 2. Schedule pre-installation conference at project site after completion of the installation of roof sheathing but before installation of any roofing system component.
 3. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review if Project is in high wind area.
 - b. Review if Project could have ice dam problems.
 - c. Review if Project could have fungus-algae resistance problems.
 - d. Review Shingle Manufacturer's ventilation requirements.
 - e. Review Shingle Manufacturer's Ambient Conditions requirements.
 - f. Review existing roof conditions including moisture on deck, protruding deck fasteners, specified gaps between sheathing, and other items affecting issuance of roofing warranty.
 - g. Review proper valley, flashing, penetrations, secondary underlayment, sealants, and nailing requirements.
 - h. Review racking installation method is not permitted.
 - i. Review Cleaning and Disposal requirements.
 - j. Review Special Procedure Submittal for Warranty Information to be given to Manufacturer before Manufacture will issue Roof Warranty by Installer.
 - k. Review safety issues.
- B. Sequencing:
 1. Sequence of Roofing Materials (see valley flashing detail in Contract Drawings):

- a. Apply continuous **12 inches (300 mm)** wide strip at edge of eaves and rakes of secondary underlayment.
 - b. Metal drip edge.
 - c. Secondary underlayment.
 - d. Apply three (3) continuous **36 inch (900 mm)** wide sheets of secondary underlayment in valley.
 - e. Install one (1) continuous **36 inch (300 mm)** wide strip of primary underlayment atop secondary underlayment and centered over valley.
 - f. Install formed valley metal over strip of primary underlayment.
 - g. Apply **12 inches (300 mm)** wide strips of secondary underlayment lapping nailed edge of formed valley metal **3 inches (75 mm)**.
 - h. Primary underlayment.
 - i. Asphalt shingles.
 - j. Counter flashings over step flashing.
2. Coordinate sequencing of products furnished in Section 07 7226: 'Ridge Vents'.

1.4 SUBMITTALS

A. Action Submittals:

1. Product Data:
 - a. Color and style selection.
2. Samples:
 - a. Full size shingle.

B. Informational Submittals:

1. Certificates:
 - a. Installers:
 - 1) Provide current Certification for completion of certified training from Shingle Manufacturer.
 - 2) Installer's signed certificate stating roofing system complies with Contract Documents performance requirements and work only performed by trained and authorized personnel in those procedures.
2. Tests And Evaluation Reports:
 - a. Manufacturer's test reports.
 - b. ICC-ESR evaluation report.
 - c. Wind speed coverage for warranted wind speed.
3. Manufacturers' Instructions:
 - a. Shingle Manufacturer's installation instructions and details for installation of secondary underlayment at penetrations, dormers, eaves, rakes, etc, to fit environmental conditions at Project.
4. Special Procedure Submittals:
 - a. Contact Owner's Representative (FM Group or Project Manager) for following information:
 - 1) Installer to include following mandatory information to be added to 'Roofing Manufacturer System Warranty' submitted with Closing Documents.
 - a) Name of Owner (name of FM Group) _____
 - b) Mailing Address (FM office address) _____
 - c) Building Property ID (unique 7 digit identifier) _____
 - d) Project site address: _____
 - e) Roof Completion Date _____
 - f) Any addition data required from Manufacturer.
 - 2) Installer to include following mandatory information to be added to 'Roof Installer Workmanship Warranty' submitted with Closing Documents:
 - a) Name of Owner (name of FM Group) _____
 - b) Mailing Address (FM office address) _____
 - c) Building Property ID (unique 7 digit identifier) _____
 - d) Project site address: _____
 - e) Roof Completion Date _____
 - f) Any addition data required from Manufacturer.
5. Qualification Statement:

- a. Installer:
 - 1) Asphalt Shingles:
 - a) Provide Qualification documentation.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation:
 - 1) Asphalt Shingles:
 - a) Final, executed copy of 'Roofing Manufacturer System Warranty' including wind speed coverage and required Owner mandatory information.
 - b) Final, executed copy of 'Roof Installer Workmanship Warranty' including required Owner mandatory information.
 - 2) Verify mandatory information as specified in Special Procedure Submittal has been included in Final Warranty.
 - b. Record Documentation:
 - 1) Manufacturers Documentation:
 - a) Manufacturer's literature.
 - b) Color selections.
 - c) Test and evaluation reports.
 - 2) Roofing Inspection Documentation:
 - a) Include copy of roof inspection report.
 - 3) Certificate: Installer statement of compliance for performance requirements.
 - 4) Certificate: Installer completion of certified training.
 - 5) Test And Evaluation Report: UL fire-resistance rating test report.
 - 6) Test And Evaluation Report: NFPA 101 Class A approval.
 - 7) Test And Evaluation Report: Wind resistance requirements required.
- D. Maintenance Material Submittals:
 - 1. Extra Stock Materials:
 - a. Provide one (1) square minimum of bundled shingles.

1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Building Codes:
 - a. Meet requirements for NFPA 101 Class A roof assembly.
 - b. Roof system will meet requirements of all federal, state, and local codes having jurisdiction.
 - 2. Fall Protection: Meet requirement of fall protection as required by federal, state, and local codes having jurisdiction.
 - 3. Fire Characteristics:
 - a. Provide shingles and related roofing materials with fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL / ULC or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency:
 - 1) Exterior Fire-Test Exposure: Class A; UL 790 or ASTM E108, for application and roof slopes indicated.
 - a) Materials shall be identified with appropriate markings of applicable testing agency.
 - 4. Impact Resistance:
 - a. Meet UL 2218 impact resistant testing.
 - b. Meet UL 2218 Class 4 impact resistant rating for hail.
 - 5. Wind Resistance:
 - a. Meet ASTM D3161/D3161M for wind resistance.
 - 1) Installation shall comply with IBC Table 1507.2.7, 'Attachment'.
 - 6. Wind Speed:
 - a. As required to meet local codes having jurisdiction.
 - 7. Wind Uplift Resistance:
 - a. Meet UL 580 wind uplift of roof assemblies.
 - b. Meet UL 1897 uplift test for roof covering systems.
 - c. Meet ASTM D7158/D7158M for wind resistance for uplift force/uplift resistance.

- B. Qualifications:
1. Manufacturer:
 - a. Asphalt Shingles:
 - 1) Asphalt shingles are required to be produced under quality control program administered by inspection agency currently accredited by ICBO ES or recognized by National Evaluation Service, Inc. Quality control manual developed in consultation with approved agency, and complying with ICBO ES Acceptance Criteria for Quality Control Manuals (AC10), must be submitted.
 - b. Underlayment:
 - 1) Underlayment is required to be manufactured under approved quality control program with inspections by inspection agency accredited by International Accreditation Service (IAS) or otherwise acceptable to ICC-ES.
 - 2) Quality documentation complying with ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted for roof underlayment.
 2. Roof Installer Foreman Qualifications:
 - a. Requirements of Section 01 4301 applies but not limited to the following:
 - 1) Provide documentation if requested by Architect.
 - a) Approved and authorized by Roofing Manufacturer to install Manufacturer's product and eligible to receive Manufacturer's warranty before bid.
 - b) Completed Shingle Manufacturer's certified trained.
 - c) Have thorough knowledge of installing asphalt shingle roofing and have minimum of five (5) years roofing experience.
 - d) Current license for the city, county, and state where project is located and license for specific type of roofing work to be performed.
 - e) Roofing Installer's foreman shall be skilled in his trade and qualified to lay out and supervise the Work.
 - f) Flashing installation shall be performed by personnel trained and authorized by Roofing Manufacturer.
 3. Roof Installer:
 - a. Provide 'Roof Installer Workmanship Warranty' as specified in Warranty in Part 1 of this specification.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
1. Make no deliveries to job site until installation is about to commence, or until approved storage area is provided.
 2. Deliver products job site in Manufacturer's original unopened containers or wrappings with labels intact and legible bearing all seals and approvals.
 3. Deliver materials in sufficient quantities to allow continuity of work.
 4. Remove any material not approved from job site.
- B. Storage And Handling Requirements:
1. Storage Requirements:
 - a. Follow Manufacturer's instructions and precautions for storage and protection of materials.
 - b. Protect roof materials from physical damage, moisture, soiling, and other sources in a clean, dry, protected location.
 - c. Stacking:
 - 1) Shingles: Bundles should be stacked flat.
 - 2) Underlayment:
 - a) Do not double-stack pallets.
 - b) Stack rolls upright until installation.
 - d. Temperature:
 - 1) Shingles:
 - a) Store in covered ventilated area at maximum temperature of 110 deg F (43 deg C).
 - b) Use extra care in handling shingles when temperature is below 40 deg F (4.4 deg C).
 - 2) Underlayment: Store in area with temperature between 40 deg F and 100 deg F (4.4 deg C and 38 deg C).

- e. Unacceptable Material:
 - 1) Remove from job site materials that are determined to be damaged by Architect or by Roofing Manufacturer and replace at no additional cost to Owner.
2. Handling Requirements:
 - a. Handle rolled goods so as to prevent damage to edge or ends.
3. Roof Top Loading:
 - a. Lay shingle bundles flat.
 - b. Do not bend over ridge.

1.7 FIELD CONDITIONS

- A. Ambient Conditions:
 1. General:
 - a. Proceed with installation only when existing and forecasted weather conditions permit roofing to be performed according to manufacturer's written instructions and warranty requirements.
 2. Shingles:
 - a. Do not install shingles at lower temperatures than allowed by Shingle Manufacturer for application.
 3. Underlayment:
 - a. Install self-adhering sheet underlayment within range of ambient and substrate temperatures recommended by manufacturer.

1.8 WARRANTY

- A. Special Warranty:
 1. Shingle Manufacturer's special forty (40) year minimum labor and material warranty written for VMR program, including but not limited to:
 - a. CertainTeed:
 - 1) First ten (10) years minimum of warranty will provide for full replacement cost, including tear-off and disposal, for any failure, including material defects and workmanship. Remaining thirty (30) years of warranty will provide for pro-rated replacement cost.
 - b. GAF:
 - 1) First ten (10) years minimum of warranty will provide for full replacement cost, including tear-off and disposal, for any failure, including material defects and workmanship. Remaining thirty (30) years of warranty will provide for pro-rated replacement cost.
 - c. Owens Corning:
 - 1) First ten (10) years minimum of warranty will provide for full replacement cost, including tear-off and disposal, for any failure, including material defects and workmanship. Remaining thirty (30) years of warranty will provide for pro-rated replacement cost.
 2. Roofing system will resist blow-offs in winds up to **110 mph (177 kph)** for ten (10) years when installed as specified below.
 - a. Meet requirements of ASTM D3161/D3161M UL Class D.
 3. Roof Installer Workmanship Warranty:
 - a. Provide ten (10) year workmanship warranty on roofing system and related components, including flashings, and responsible for all repairs to roofing system and related components due to roof installer's own negligence or faulty workmanship:
 - 1) In the event that, during ten (10) year period following installation, Roof Installer defaults or fails to fulfill its obligation in relation to workmanship warranty as specified in Manufacturer's Agreement, Manufacturer will assume that obligation for remainder of ten (10) year period following original installation and Owner shall have no obligation to make or pay for repairs to or materials for roofing system that are necessary due to Roof Installer's negligence or faulty installation during that period.

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

- a. CertainTeed Roofing Products, Valley Forge, PA www.certainteed.com.
 - 1) Contact Information: Wendy Fox, (800) 404-9880 wfox@dataworksintl.com.
- b. GAF Materials Corp., Wayne, NJ www.gaf.com.
 - 1) Contact Information: John Arellano (office) (210) 896-1041 (fax) (210) 259-8050.
- c. Owens Corning, Toledo, OH www.owenscorning.com.
 - 1) Duration Premium shingles are available in all areas of the USA and Canada including all Duration Premium colors under LDS Church contract. Request shingles through local distribution. Any distribution questions, contact Area Sales Manager.
 - 2) For all other questions, Contact: Sam Baroudi (419) 248-7754 sam.baroudi@owenscorning.com. or Robert Hill (801) 553-2417 Robert.Hill@owenscorning.com.

B. Components:**1. Shingles And Underlayment:**

- a. Fiberglass mat shingles meeting or exceeding requirements of:
 - 1) UL Class A Fire Resistance.
 - 2) ASTM D3018/D3018M, Type I (self sealing).
 - 3) ASTM D3161/D3161M UL Class D.
 - 4) ASTM E108 Class A.
 - 5) CSA A123.1/A123.5 (Canadian standard).
 - 6) ASTM D3462/D3462M where required by local codes.
 - 7) Impact Resistant Shingles: Meet requirements of UL 2218 Class 4 Impact, ASTM E108 Class A Fire Resistance, ASTM D3161/D3161M Class F Wind, ASTM D7158/D7158M Class H Wind, ASTM D3018/D3018M Type 1, ASTM D3462/D3462M, and UL 790 Class A Fire Resistance.
 - 8) Primary Underlayment: Meet requirements of ASTM D226/D226M and ASTM D4869/D4869M.
 - 9) Secondary Underlayment: Meet requirements of ASTM D1970/D1970M and UL 790 Class A Fire Resistance.
 - 10) Synthetic Underlayment: Meet requirements of ASTM D226/D226M and ASTM D4869/D4869M (physical properties only) or ASTM D1970/D1970M and ASTM E108 Class A Fire.
 - 11) Color as selected by Architect from Shingle Manufacturer's full color line.
- b. Category One VMR Products And Manufacturers. See Section 01 6200 for definitions of Categories:
 - 1) CertainTeed:
 - a) Shingles:
 - (1) Standard Wind: Hatteras / Landmark Premium.
 - (2) Hip And Ridge Shingles: Shadow Ridge or Laminate Accessory for shingle used.
 - b) Primary Underlayment Under Shingles:
 - (1) Synthetic Underlayment: Diamond Deck.
 - c) Secondary Underlayment Under Shingles:
 - (1) WinterGuard Granular.
 - or
 - (2) WinterGuard Sand.
 - or
 - (3) WinterGuard High Tack/High Temperature.
 - d) Secondary Underlayment Under Shingles over Unheated Buildings:
 - (1) Not required over unheated buildings such as Storage Shed.
 - 2) GAF:
 - a) Shingles:
 - (1) Standard Wind: Timberline Ultra HD.

- (2) Hip And Ridge Shingles: TimberTex or Ridglass.
- b) Primary Underlayment Under Shingles:
 - (1) Synthetic Underlayment: Tiger Paw.
- c) Secondary Underlayment Under Shingles:
 - (1) Weatherwatch.
 - or
 - (2) StormGuard.
- d) Secondary Underlayment Under Shingles over Unheated Buildings:
 - (1) Not required over unheated buildings such as Storage Shed.
- 3) Owens Corning:
 - a) Note:
 - (1) Duration Premium shingles are available in all areas of the USA and Canada including all Duration Premium colors under LDS Church contract. Request shingles through local distribution.
 - (2) Any questions, contact Manufactures Area Sales Manager.
 - b) Shingles:
 - (1) Standard Wind: Duration Premium shingles.
 - (2) Hip And Ridge Shingles: DecoRidge Hip & Ridge.
 - c) Primary Underlayment Under Shingles:
 - (1) Synthetic Underlayment: Deck Defense High Performance Roof Underlayment.
 - d) Secondary Underlayment Under Shingles:
 - (1) Weatherlock G Granulated Self-Sealing Ice & Water Barrier.
 - or
 - (2) Weatherlock Specialty Tile & Metal for High Temperature.
 - or
 - (3) Weatherlock Cold Climate for cold weather adhesion and flexibility.
 - e) Secondary Underlayment Under Shingles over Unheated Buildings:
 - (1) Not required over unheated buildings such as Storage Shed.

2.2 ACCESSORIES

A. Fasteners:

- 1. Primary Underlayment:
 - a. Corrosion resistant roofing nails with **one inch (25 mm)** diameter head and **3/4 inch (19 mm)** long shank minimum.
 - 1) If shingles applied as underlayment is laid, use metal or plastic head Simplex roofing nails.
 - 2) If shingles not applied as underlayment is laid, use plastic head only.
 - b. Staples not permitted.
- 2. Shingles:
 - a. Design Criteria:
 - 1) Meet following requirements for nails:
 - a) Comply with ASTM F1667, Type I, Style 20-Roofing Nails.
 - b) Eleven gauge galvanized steel or equivalent corrosion-resistant roofing nail.
 - c) Nail head sizes: **3/8 inch (9.5 mm)** nominal diameter.
 - d) Sufficient length to penetrate through roof sheathing **1/4 inch (6 mm)** or **3/4 inch (19 mm)** minimum into solid wood decking.
 - e) Hot-dipped galvanized or electroplated fasteners comply with requirements of ASTM A153, Class D.
 - f) Stainless-steel fasteners meet requirements of Type 304 (UNS S30400) or Type 316 (UNS S31600).
 - b. General:
 - 1) Hot-dipped galvanized, electroplated non-corrosive gun-driver nails, or stainless steel fasteners may be used.
 - 2) Fasteners within **15 miles (24.1 km)** of coastal areas (oceanside) applications must use hot-dipped galvanized or stainless steel.
 - 3) All exposed fasteners (including ridge shingles) must use hot-dipped galvanized or stainless steel.

- 4) Staples not permitted.

B. Elastomeric Roofing Sealant:

1. Design Criteria:
 - a. Meet requirements of ASTM D3019.
 - b. Non asphalt roofing cement (not permitted).
 - c. Elastomeric.
 - d. Cold temperature pliability.
 - e. Compatible with roof penetration boots.
2. Category Four Products And Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Flintbond SBS Modified Bitumen Caulk by CertainTeed.

PART 3 - EXECUTION

3.1 INSTALLERS

A. VMR Manufacture's Approved Roofing Installers: See Section 01 4301.

1. Approved Installers:
 - a. CertainTeed:
 - 1) American Roofing Co. (AMCO), Salt Lake City, UT – Contact: Keith J Yorgason (801) 269-1276.
 - 2) Far West Roofing, Bluffdale, UT – Contact Douglas Cooper (801) 253-7799.
 - 3) Heritage Roofing, Bluffdale, UT – Contact: Russ or Jim (801) 576-8447.
 - 4) Island Heights Construction Inc., Logan, UT – Contact: Alan Ringer (435) 753-7403.
 - 5) JTS Roofing Inc., Ogden, UT – Contact: Todd Shupe (801) 627-6450.
 - 6) Kendrick Bros Roofing Inc., Ogden, UT – Contact: Greg Kendrick (801) 430-6060.
 - 7) Mountain Peak Builders, Inc., Logan, UT – Contact: Zane Rust (435) 232-1367.
 - 8) North Face Roofing, Inc., Park City, UT – Craig Peters (801) 455-8492.
 - 9) Perkes Roofing, Ogden, UT – Contact: Jon Bertagnolli (801) 430-4489.
 - 10) Redd Roofing Co., Ogden, UT – Lance Redd (801) 621-1363.
 - 11) Skyline Roofing, Inc. Adam Stout, LaVerkin, UT (435) 635-3172.
 - 12) Stout Roofing Inc., St George, UT - Contact: Kelly Casey (435) 635-4288.
 - 13) Stuart Roofing, Ogden, UT, Forest Stuart (801) 394 1923.
 - 14) VIP Roofing, Centerville, UT – Contact: Max Ker (801) 631-6182.
 - 15) Warburton's Inc., Pleasant Grove, UT - Contact: Greg Warburton (801) 785-9500.
 - 16) White Roofing Co., Nephi, UT – Contact: Shannon White (435) 623-0241.
 - b. GAF:
 - 1) American Roofing Co. (AMCO), Salt Lake City, UT – Contact: Keith Yorgason (801) 269-1276.
 - 2) Aspen Roofing, Salt Lake City, UT – Contact: Jon Brady (801) 483-1660.
 - 3) Capital Roofing Service, Inc., Sandy, UT – Contact: Paul Hitzman (801) 562-5568.
 - 4) Fortress Roofing, Murray, UT – Contact: Adam Cordon (801) 509-8625.
 - 5) Knockout Roofing, Riverton, UT – Contact Jared Gran (801) 604-4090.
 - 6) Lifetime Roofing, West Point, UT - Parker Cornably (801) 200-7426.
 - 7) Parrish Construction, American Fork, UT – Contact: Tyler Parrish (801) 787-3633.
 - 8) RSW Plus, Nephi, UT – Contact: Rick White (435) 623-1719.
 - 9) Skyline Roofing Inc., La Verkin, UT - Contact: Adam Stout (435) 635-3172.
 - 10) Wesley Green Roofing, UT – Contact: Scott Horsepool (801) 486-3411.
 - c. Owens-Corning:
 - 1) American Roofing Co. (AMCO), Salt Lake City, UT – Contact: Keith J Yorgason (801) 269-1276.
 - 2) Intermountain West Contractors, West Jordan, UT - Phone: 801-232-5690, Email: iwcroofingutah@gmail.com
 - 3) Infinity Roofing & Siding, Inc., Salt Lake City, UT - Phone: 801-512-2691, Email: dereklindsey@infinityroofer.com

3.2 EXAMINATION

- A. Verification Of Conditions:
 - 1. Examine deck to determine if it is satisfactory for installation of roofing system. Conditions include, but are not limited to, moisture on deck, protruding deck fasteners, specified gaps between sheathing, and other items affecting issuance of roofing warranty.
 - a. Report unsatisfactory conditions in writing to Architect.
 - b. Commencement of Work by installer is considered acceptance of substrate.
 - 2. Verify existing soffit and ridge vents meet ventilation code requirements.
 - a. Report inadequate ventilation conditions with recommendations in writing to Architect.

3.3 PREPARATION

- A. Protection Of In-Place Conditions:
 - 1. Install only as much roofing as can be made weathertight each day, including flashing and detail work.
- B. Surface Preparation:
 - 1. Clean roof deck:
 - a. Remove dirt, protruding nails, shingle nails, and debris, before installation of underlayment.
 - 2. Roof deck must be dry to help prevent buckling of deck, which can result in deck movement and damage to primary underlayment.
 - 3. Following Manufacturer's recommendations for placing materials on roof.
 - a. Prevent material from sliding off roof.

3.4 INSTALLATION

- A. General:
 - 1. Schedule and execute work without exposing interior building areas to effects of inclement weather. Protect existing building and its contents against all risks.
- B. Sequence of Roofing Materials as shown and noted on Contract Drawings:
 - 1. 12 inch strip Secondary Underlayment at Eave.
 - 2. Metal Drip Edge.
 - 3. General Secondary Underlayment. Note areas on construction documents which indicate roof areas which are to receive underlayment at entire roof deck.
 - 4. Valley Secondary Underlayment (8' - 6" (2.62 m) wide strip of Secondary Underlayment (3 strips) in Valleys applied over sheathing).
 - 5. Valley Secondary Underlayment (36 inch (915 mm) wide Primary Underlayment under Valley Metal).
 - 6. Valley Metal (24 inch (610 mm) wide valley metal 10 ft (3.05 m) lengths).
 - 7. 12 inch strip of Secondary Underlayment over nailed edges (of Valley Metal).
 - 8. General Primary Underlayment.
 - 9. Asphalt Shingles, Step Flashings.
 - 10. Counter Flashing.
- C. Underlayment:
 - 1. General:
 - a. Follow Shingle Manufacturer's recommendations for installation of primary and secondary underlayment, particularly at eaves, rakes, and penetrations, unless specified installation procedures and Contract Drawing details are more stringent.
 - b. Avoid scuffing underlayment that can compromise surface and cause leaking. If scuffing occurs, following Manufacturer's recommendation for repair.
 - c. Staples are not permitted.
 - d. Weather conditions:
 - 1) Do not leave underlayment exposed to weather more than thirty (30) days after beginning of underlayment installation even if Manufacture allows longer period of time.

- 2) If underlayment is exposed for more than thirty (30) days after beginning of underlayment installation, treat as temporary roof under first paragraph above.
- 3) If moisture is deposited on exposed underlayment, obtain written approval from Shingle Manufacturer's Representative before installing shingles.
- e. Install valley secondary underlayment, valley primary underlayment, and valley metal after installation of general secondary underlayment, but before installation of general primary underlayment.
2. Primary Underlayment:
 - a. Apply 48 inch (1 200 mm) wide courses over complete deck, including areas covered with secondary underlayment unless specified otherwise.
 - 1) Overlap underlayment before fastening.
 - 2) Maintain end laps of 6 inch (150 mm) and side laps of 3 inch (76 mm).
 - 3) Stop primary underlayment between 3 and 6 inches (75 and 150 mm) of inside edge of strip of secondary underlayment installed over edge of formed valley metal.
 - b. Nailing Synthetic Underlayment:
 - 1) Use low-profile plastic or steel cap corrosion resistant nails with 1 inch (25 mm) diameter heads to fasten underlayment in place. (Fastening underlayment without caps is not permitted).
 - 2) Nails must be driven properly. Improperly driven fasteners such as over-driving, under-driving and nails driven at an angle are not permitted.
 - 3) Fasteners should be long enough to penetrate at least 3/4 inch (19 mm) into roof sheathing. Fasteners must be lie flush to roof deck at 90 degree angle to roof deck and tight with underlayment.
 - 4) Do not nail through metal flashing, except drip edge, when installing primary underlayment.
 - 5) Follow Shingle Manufacturer's installation instructions for following:
 - a) Securing underlayment to roof deck adjusting for roof slope nailing requirements.
 - b) Side lap, end lap, and overlapping nailing requirements.
 - c) Rake and eave nailing requirements.
 - d) High wind condition nailing requirements.
 - e) Sealants recommendations.
- D. Shingles:
 1. Before installing shingles, inspect underlayment and metal installation with Architect and Owner. Correct improperly installed and damaged material before beginning shingle installation.
 2. Racking installation method is not permitted by Owner and will be considered non-conforming work.
 3. Starter shingles:
 - a. Manufacturer's starter shingles are required for Warranty.
 - b. Install shingles at eve and rakes in accordance with Shingle Manufacturer's instructions.
 - c. Cut shingles in accordance with Shingle Manufacturer's instructions, or use approved starter course.
 - d. Nail to eave granule side up in continuous mastic bed with cut edge down-slope and edge overhanging eave 3/8 inch (9 mm) so sealing tabs are at edge of eave.
 - e. Install shingles with maximum exposure recommended by Shingle Manufacturer.
 - f. Lay first course directly over starter strip with ends flush with starter strip at eaves and so joints in starter strip are offset 4 inches (100 mm) minimum from joints in first course.
 4. Lay shingles so end joints are offset in accordance with Shingle Manufacturer's installation procedures.
 5. Insure alignment by snapping chalk line at least each fifth course to control horizontal and vertical alignment.
 6. Run courses true to line with end joints properly placed. Leave shingles flat without wave and properly placed.
 7. Hip and ridge shingles:
 - a. Manufacturer's hip and ridge shingles are required for Warranty.
 - b. Install specified hip and ridge shingles in accordance with Shingle Manufacturer's instructions.
 - c. Run ridge shingles as directed by Architect.
 8. Nailing:
 - a. General:

- 1) Six (6) Nail Pattern as recommended by Shingle Manufacturer in each shingle.
 - 2) Place in relation to top edge of shingle as required by Shingle Manufacturer.
 - 3) Place nails **one inch (25 mm)** from each end of shingle and remainder evenly spaced between.
 - 4) Should any nail fail to penetrate sheathing by **1/4 inch (6 mm)** minimum, drive additional nail nearby.
- b. Nailing guns:
- 1) Nails must be driven properly. Improperly driven fasteners such as over-driving, under-driving and nails driven at an angle are not permitted.
 - 2) Adjust nail gun pressure for nailing flush and tight to deck without cutting shingle surface.
 - 3) Drive nails perpendicular to shingle surface so nail head is flat against shingle.
 - 4) Should any nail fail to penetrate sheathing by **1/4 inch (6 mm)** minimum, drive additional nail nearby.
9. Hand-Sealing:
- a. If ambient temperature or exposure to sun will not be sufficient to secure adhesive strip to under-lying shingle within one week, hand seal shingles with elastomeric roofing sealant.

3.5 FIELD QUALITY CONTROL

A. Non-Conforming Work:

1. Correct any work found defective or not complying with Contract Document requirements at no additional cost to the Owner.
2. Raking installation method is not permitted by Owner and will be considered to be not complying with Contract Document requirements and must be corrected at no additional cost to Owner.

3.6 CLEANING

A. General:

1. All tools and unused materials must be collected at end of each workday and stored properly off finished roof surface and protected from exposure to elements.
2. Leave metals clean and free of defects, stains, and damaged finish.
 - a. Replace fascia metal that is scratched through finish to base metal.
3. Properly clean finished roof surface after completion.
4. Verify drains and gutters are not clogged.
5. Clean shingles and building of soiling caused by this installation.
6. Clean and restore all damaged surfaces to their original condition.

B. Waste Management:

1. Disposal:
 - a. All work areas are to be kept clean, clear and free of debris at all times.
 - b. Do not allow trash, waste, or debris to collect on roof. These items shall be removed from roof on a daily basis.
 - c. Remove debris resulting from work of this Section from roof and site. Dispose of or recycle all trash and excess material in manner conforming to current EPA regulations and local laws.

3.7 PROTECTION

- A. Do not permit traffic over finished roof surface.

END OF SECTION

SECTION 07 4616**ALUMINUM SIDING****PART 1 - GENERAL****1.1 SUMMARY**

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

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Manufacturer's published installation instructions.
- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation:
 - 1) Final, executed copy of Warranty.
 - b. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature.
 - b) Color selection.

1.3 WARRANTY

- A. Manufacturer Warranty:
 - 1. Manufacturer's written 20-year guarantee for finishes.

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Manufacturers:
 - 1. Metal Panel Siding:
 - a. Type One Acceptable Manufacturers:
 - 1) Alcoa Architectural Products, Eastman, GA www.alcoaarchitecturalproducts.com.
 - 2) Alside Inc, Cuyahoga Falls, OH www.alside.com.
 - 3) Gentek Building Products, Akron, OH and Burlington, ON www.gentekinc.com.
 - 4) Equal as approved by Architect before bidding. See Section 01 6200.
- B. Materials:
 - 1. Description:
 - a. Aluminum: 0.024 inch (0.6 mm) thick minimum complete with accessories recommended by Manufacturer for proper installation.
 - b. Configuration: Ribbed panel siding to match existing.
 - 2. Color:
 - a. As selected by Architect from Manufacturer's standard colors.
- C. Finishes: Double baked enamel or PVC with protective coating on reverse side.

2.2 ACCESSORIES

- A. Fasteners: Unpainted one inch (25 mm) aluminum screws or 1-1/2 inch (38 mm) ring-shanked nails.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Isolate dissimilar metals to prevent electrolytic action.
- B. Paint exposed fasteners to match siding.

END OF SECTION

SECTION 07 6240**ALUMINUM FLASHING AND TRIM****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install aluminum flashing, counterflashing, transition metal and hold-down clips as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 07 9213: Elastomeric Joint Sealant.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
 - 1. Type Two Acceptable Manufacturers Of Metal:
 - a. ATAS International, Inc., Allentown PA www.ATAS.com.
 - b. Fabral, Lancaster, PA www.fabral.com.
 - c. Firestone Metal Products, Anoka, MN www.unaclad.com.
 - d. MBCI, Houston, TX www.mbc.com.
 - e. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
 - f. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
 - g. Ryerson, Chicago, IL www.ryerson.com.
 - h. Equal as approved by Architect before installation. See Section 01 6200.
- B. Materials:
 - 1. Sheet Aluminum:
 - a. 3105-H25 alloy.
 - 1) Flashing And Counterflashing: **0.040 inch (one mm)** thick minimum.
 - 2) Hold-Down Clips: **0.050 inch (1.27 mm)** thick minimum.
 - b. Finish:
 - 1) Unexposed: Mill finish.
 - 2) Exposed To View:
 - a) Face coating of polyvinylidene Fluoride (PVF₂) Resin-base finish (Kynar 500 or Hylar 5000) containing 70 percent minimum PVF₂ in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
 - b) Color as selected by Architect from Manufacturer's standard colors.
- C. Fabrication:
 - 1. Form accurately to details.
 - 2. Profiles, bends, and intersections shall be even and true to line.
 - 3. Fold exposed edges **1/2 inch (13 mm)** to provide stiffness.

2.2 ACCESSORIES

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

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Slope to provide positive drainage.
- B. Provide sufficient hold down clips to insure true alignment and security against wind.
- C. Install with 4 inch (100 mm) minimum overlap.
- D. Bed overlap joints in appropriate sealant specified in Section 07 9213.
- E. Form and lap step flashings.
- F. Allow sufficient tolerance for expansion and contraction.
- G. Insulate work to prevent electrolytic action.

3.2 CLEANING

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

END OF SECTION

SECTION 07 6310**STEEP SLOPE ROOF FLASHING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Drip Edge
- B. Related Requirements:
 - 1. Section 07 3113: 'Asphalt Shingles' for installation.
 - 2. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants.

1.2 REFERENCES

- A. Definitions:
 - 1. Base Flashing: That portion of flashing attached to or resting on roof deck to direct flow of water onto the roof covering.
 - 2. Cap Flashing: Material used to cover top edge of base flashings or other flashings to prevent water seepage behind base flashing. Cap flashing overlaps base flashing.
 - 3. Collar: Pre-formed flange placed over vent pipe to seal roof around vent pipe opening. Also called vent sleeve.
 - 4. Drip Edge: Non-corrosive, non-staining material used along eaves and rakes to allow water run-off to drip clear of underlying building.
 - 5. Flange: Metal pan extending up and down roof slope around flashing pieces. Usually at plumbing vents.
 - 6. Flashing: Components used to prevent seepage of water into a building around any intersection or projection in a roof such as vent pipes, adjoining walls, and valleys.
 - 7. Metal Flashing: Roof components made from sheet metal that are used to terminate roofing membrane or other material alongside roof perimeters as well as at roof penetrations.
 - 8. Penetration: Any object that pierces surface of roof.
 - 9. Pipe Boot: Prefabricated flashing piece used to flash around circular pipe penetrations. Also known as a Roof Jack.
 - 10. Roof Jack: Term used to describe a Pipe Boot or Flashing Collar.
 - 11. Valley: Internal angle formed by intersection of two sloping roof planes to provide water runoff.
 - 12. Vent: Any outlet for air that protrudes through roof deck such as pipe or stack. Any device installed on roof, gable or soffit for purpose of ventilating underside of roof deck.
 - 13. Vent Sleeve: See collar.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM A653/A653M-11, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
 - b. ASTM A792/A792M-10, 'Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process'.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Manufacturers:
 - 1. Type Two Acceptable Manufacturers:

- a. CMG – Coated Metals Group, Denver, CO www.cmgmetals.com.
 - b. Englert Inc, Perth Amboy, NJ www.englertinc.com.
 - c. Drexel Metals, LLC, Ivyland, PA www.drexmet.com.
 - d. Fabral, Lancaster, PA www.fabral.com.
 - e. Firestone Metal Products, Anoka, MN www.unaclad.com.
 - f. MBCI, Houston, TX www.mbc.com.
 - g. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
 - h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
 - i. Ryerson, Chicago, IL www.ryerson.com.
 - j. Equal as approved by Architect before installation. See Section 01 6200.
- B. Drip Edge:
1. Metal:
 - a. Aluminum: 0.032 inch (0.81 mm) thick minimum.
- C. Fabrication:
1. Profiles, bends, and intersections shall be even and true to line.
- D. Finishes:
1. Face coating polyvinylidene Fluoride (PVF₂) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing seventy (70) percent minimum PVF₂ in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
 2. Reverse side coating of steel flashings to be thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.
 3. Color as selected by Architect from Manufacturer's standard colors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work:
1. Coordinate with pipe installers for proper size of roof jacks and pipe flashing.

END OF SECTION

SECTION 07 6312**PERFORATED METAL SOFFIT****PART 1 - GENERAL****1.1 SUMMARY**

A. Includes But Not Limited To:

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

1.2 REFERENCES

A. Association Publications:

1. American Architectural Manufacturers Association:
 - a. AAMA 1402-09, 'Standard Specification for Aluminum Siding Soffit and Fascia'.

B. Reference Standards:

1. ASTM International:
 - a. ASTM A653/A653M-13, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
 - b. ASTM A792/A792M-10, 'Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process'.
 - c. ASTM E84-13a, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
2. Military Specifications and Standards:
 - a. MIL-DTL-5541F, 'Chemical Conversion Coatings On Aluminum And Aluminum Alloys' (Superseding MIL-C-5541E) 11-Jul-2006'.

1.3 SUBMITTALS

A. Action Submittals:

1. Product Data:
 - a. Manufacturer's literature or cut sheet for products furnished.

B. Closeout Submittals:

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

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:

1. Fire Characteristics Performance Requirement:
 - a. Meet requirements of ASTM E84 Class A fire rating.

B. Qualifications:

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 WARRANTY

- A. Manufacturer Warranty:
 - 1. Manufacturer's written 20-year guarantee for finish.

PART 2 - PRODUCTS

2.1 SYSTEMS

- A. Manufacturers
 - 1. Type One Acceptable Manufacturers:
 - a. Alcoa Architectural Products, Eastman, GA www.alcoaarchitecturalproducts.com.
 - b. Alside Inc, Cuyahoga Falls, OH www.alside.com.
 - c. ATAS Aluminum Products, Allentown, PA www.atas.com.
 - d. Gentek Building Products, Akron, OH and Burlington, ON www.gentekinc.com.
 - e. Kaycan Ltd, Montreal, QB www.kaycan.com.
 - f. Norandex/Reynolds, Macedonia, OH www.norandexreynolds.com.
 - g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
 - h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
 - i. System 3-12L by Rollex, Elk Grove Village, IL www.rollex.com.
 - j. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Performance Requirements:
 - 1. Capacities: Installed soffit system shall meet minimum required structural loading conditions when tested in accordance with Test Method No. 4 of AAMA Specification 1402-86.
- C. Materials:
 - 1. **0.019 inch (0.48 mm)** thick minimum.
 - 2. 'V' groove design complete with matching trim.
 - 3. Panels shall be interlocked full length of panel.
 - 4. Perforated full width of panel with holes designed so one dimension does not exceed **1/8 inch (3 mm)**.
- D. Finish:
 - 1. Face finish shall meet performance requirements of Test Method No. 6 of AAMA Specification 1402-86. Reverse side coating shall pass requirements of paragraphs 1.1 through 1.4 of Test Method No. 6.
 - 2. Double baked enamel to meet or exceed specifications of MIL-DTL-5541F with protective coating on back side.
 - 3. Color as selected by Architect from Manufacturer's standard colors to match existing.

2.2 ASSESSORIES

- A. Fastening Devices:
 - 1. 1-1/4 inch (32 mm) galvanized staples or as recommended by Soffit Manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

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

3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
 - 1. Correct any work found defective or not complying with contract document requirements including buckling or bowing due to improper installation and touch up of minor scratches and spots at no additional cost to the Owner.

3.4 CLEANING

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

END OF SECTION

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

- A. Includes But Not Limited To:
 - 1. Furnish and install aluminum fascia as described in Contract Documents.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM B209-10, 'Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate'.
 - b. ASTM E84-13a, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature or cut sheet for products furnished.
- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation:
 - 1) Final, executed copy of Warranty.
 - b. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature.
 - b) Color selection.

1.3 QUALITY ASSURANCE

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

1.4 DELIVERY, STORAGE, AND HANDLING

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

1.5 WARRANTY

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

PART 2 - PRODUCTS

2.1 ASSEMBLIES

- A. Manufacturers:
 - 1. Type One Acceptable Manufacturers Of Metal:
 - a. AEP / Span, Dallas, TX www.aep-span.com.
 - b. ATAS Aluminum Products, Allentown, PA www.atas.com.
 - c. Fabral, Lancaster, PA www.fabral.com.
 - d. Firestone Metal Products, Anoka, MN www.unaclad.com.
 - e. Hunter-Douglas Canada Ltd, Brampton, ON www.hunterdouglas.com.
 - f. Jenisys Engineered Products, Goodlettsville, TN www.jenisysep.com.
 - g. Kaycan Ltd, Montreal, PQ www.kaycan.com.
 - h. MBCI, Houston, TX www.mbc.com.
 - i. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
 - j. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
 - k. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
 - l. Ryerson, Chicago, IL www.ryerson.com.
 - m. VicWest, Oakville, ON www.vicwest.ca.
 - n. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Materials:
 - 1. Aluminum: **0.032 inch (0.813 mm)** thick minimum complete with accessories recommended by Manufacturer for proper installation.
- C. Finishes:
 - 1. Face coating polyvinylidene Fluoride (PVF₂) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing 70 percent minimum PVF₂ in resin portion of formula. Thermocured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
 - 2. Color as selected by Architect from Manufacturer's standard colors.
- D. Fabrication: Fascia may either be shop-fabricated using metal from a specified manufacturer, or a factory-fabricated standard system from a specified manufacturer.

2.2 ACCESSORIES

- A. Fastening Devices: **One inch (25 mm)** zinc or cadmium plated screws.
- B. Continuous Soffit Vent:
 - 1. Type Two Acceptable Products:
 - a. Aluminum **8.8 sq in (56.8 sq cm)** net free ventilation per **lineal foot (0.32 m)**. Width: **2 inches (50 mm)**. Color: white or brown.
 - 1) Mastic VAS70 Vent-A-Strip (Model 70) by Mastic Home Exteriors by Ply Gem Chicago, IL www.mastic.com/.
 - b. Aluminum **9.9 sq in (63.9 sq cm)** net free ventilation per **lineal foot (0.32 m)**. Width: **2-1/4 inches (57 mm)**. Color: white or brown.
 - 1) Mastic VAS79 Vent-A-Strip (Model 79) by Mastic Home Exteriors by Ply Gem Chicago, IL www.mastic.com/.

- c. 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 framing is suitable for installation of fascia.
 - 2. Notify Architect of unsuitable conditions in writing.
 - a. Do not install fascia over unsuitable conditions.
 - b. Commencement of Work by installer is considered acceptance of substrate.

3.2 INSTALLATION

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

3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
 - 1. Correct any work found defective or not complying with contract document requirements including buckling or bowing due to improper installation and touch up of minor scratches and spots at no additional cost to the Owner.

3.4 CLEANING

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

END OF SECTION

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SECTION 07 7123**MANUFACTURED GUTTERS AND DOWNSPOUTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install gutters and downspouts as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 07 9213: 'Elastomeric Joint Sealant', for quality of sealants for joints.

1.2 REFERENCES

- A. Reference Standard:
 - 1. Sheet Metal & Air Conditioning Contractors National Association Inc:
 - a. SMACNA Architectural Sheet Metal Manual, (7th edition 2012).

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings: Show gutter cross-section, mounting method, gauge of metal, expansion joint design and locations, and downspout locations minimum.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Type Two Acceptable Manufacturers of Metal:
 - a. ATAS Aluminum Products, Allentown, PA www.atas.com.
 - b. CMG – Coated Metals Group, Denver, CO www.cmgmetals.com.
 - c. Fabral, Jackson, GA www.fabral.com.
 - d. Firestone Metal Products, Anoka, MN www.unaclad.com.
 - e. MBCI, Houston, TX www.mbc.com.
 - f. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtsales.com.
 - g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
 - h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
 - i. Reynolds Metals Company, Richmond, VA www.rmc.com.
 - j. Ryerson, Chicago, IL www.ryerson.com.
 - k. Equal as approved by Architect before installation. See Section 01 6200.
- B. Materials
 - 1. Aluminum:
 - a. Downspouts: Rectangular **0.032 inch (0.813 mm)** minimum aluminum including necessary elbows.
 - b. Gutters: **0.04 inch (1.0 mm)** minimum aluminum.
 - c. Brackets: **0.06 inch (1.52 mm)** minimum aluminum.
 - 2. Screws, Bolts, Nails, And Accessory Fasteners: Non-corrosive and of strength and type consistent with function.
 - 3. Downspouts, gutters, brackets, fasteners, and accessories shall be compatible material.

- C. Fabrication:
 - 1. Fabricate in accordance with SMACNA Architectural Manual recommendations, where applicable.
 - 2. Cross-sectional configuration of gutter shall be as described in Contract Documents.
 - 3. Form accurately to details.
 - 4. Profiles, bends, and intersections shall be even and true to line.

- D. Finishes:
 - 1. Metal exposed to view shall have face coating of polyvinylidene Fluoride (PVF₂) Resin-base finish (Kynar 500 or Hylar 5000) containing seventy (70) percent minimum PVF₂ in resin portion of formula.
 - a. Thermo-cured two (2) coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
 - b. Reverse side coating shall be thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.
 - 2. Color as selected by Architect from Manufacturer's standard colors.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection Of In-Place Conditions:
 - 1. Before starting work, verify governing dimensions at building. Inspect for conditions that would prevent installation of specified system. Do not install over improper conditions.
 - 2. Insulate work from fascia as necessary to prevent electrolytic action.

3.2 INSTALLATION

- A. Allow no more than **40 feet (12 meters)** between downspouts. Lap joints in downspouts **1-1/2 inches (38 mm)** minimum in direction of water flow.

- B. Furnish and install outlet tubes and gutter ends where required. Furnish and install expansion joints in runs exceeding **50 feet (15 meters)** and in runs that are restrained at both ends. Lap other joints in gutter **one inch (25 mm)** minimum, apply sealant in lap, and stainless steel rivet **one inch (25 mm)** on center maximum.

3.3 FIELD QUALITY CONTROL

- A. Field Tests:
 - 1. At completion of this work, block downspouts and flood gutters.
 - 2. Notify Architect two (2) working days before testing.
 - 3. Repair leaks and adjust for proper drainage.

3.4 CLEANING

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

END OF SECTION

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

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

1.2 REFERENCES

- A. Association Publications:
 - 1. American Architectural Manufacturers Association (AAMA):
 - a. 'Voluntary Specifications and Test Methods for Sealants'.
 - 2. ASM International:
 - a. 'Adhesives and Sealants', Volume 3, ASM International Handbook Committee, (May 1999).
 - b. Committee C24 on Building Seals and Sealants for various Specifications, Guides, Test Methods, and Practices related to sealant specifying and application.
 - c. Committee E6 on Building Performance for various Specifications, Guides, Test Methods, and Practices related to sealant use with air barriers, vapor retarders, and exterior enclosure systems and materials.
 - 3. The Adhesive and Sealing Council, Inc. (ASC) / Sealant, Waterproofing & Restoration Institute (SWR Institute):
 - a. 'Sealants: The Professional's Guide'.
 - b. 'Joint Sealants, Whole Building Design Guide'.
- B. Definitions:
 - 1. Adhere: To cause two surfaces to be held together by adhesion.
 - 2. Adhesive: An adhesive, as defined by The American Society for Testing and Materials (ASTM), is 'a substance capable of holding materials together by surface attachment'.
 - 3. Caulk: Caulks have variety of definitions but are generally recognized as materials used in applications where only minor elastomeric properties are needed.
 - 4. Elastomer: Rubbery material which returns to approximately its original dimensions in short time after relatively large amount of deformation.
 - 5. Flow: Movement of adhesive during bonding process before adhesive is set.
 - 6. Joint: Location at which two substrates are held together with layer of adhesive.
 - 7. Primer: Coating applied to surface, prior to application of an adhesive, to improve performance of the bond.
 - 8. Sealant. Sealants are generally used in applications where elastic properties are needed while adhesives are generally used in applications where bonding strength and rigidity are needed. With technology advancements both sealants and adhesives can be used interchangeably depending on applications performance requirements.
 - 9. Sealant Types and Classifications:
 - a. ASTM Specifications:
 - 1) Type:
 - a) Type S: Single-component sealant.
 - b) Type M: Multi-component sealant.

- 2) Grade:
 - a) Grade P: Pourable or self-leveling sealant used for horizontal traffic joints.
 - b) Grade NS: Non-sag or gunnable sealant used for vertical and non-traffic joints.
 - 3) Classes: Represent movement capability in percent of joint width.
 - a) Class 100/50: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand of at least 100 percent increase and decrease of at least 50 percent of joint width as measured at time of application.
 - b) Class 50: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand increase and decrease of at least 50 percent of joint width as measured at time of application.
 - c) Class 25: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand increase and decrease of at least 25 percent of joint width as measured at time of application.
 - d) Class 12: Sealant that, when tested for adhesion and cohesion under cyclic movement shall withstand increase and decrease of at least 12 percent of joint width as measured at time of application.
 - 4) Use:
 - a) T (Traffic): Sealant designed for use in joints in pedestrian and vehicular traffic areas such as walkways, plazas, decks and parking garages.
 - b) NT (Non-Traffic): Sealant designed for use in joints in non-traffic areas.
 - c) I (Immersion): Sealant that meets bond requirements when tested by immersion (Immersion rated sealant applications require primer).
 - d) M (Mortar): Sealant that meets bond requirements when tested on mortar specimens.
 - e) G (Glass): Sealant that meets bond requirements when tested on glass specimens.
 - f) A (Aluminum): Sealant that meets bond requirements when tested on aluminum specimens.
 - g) O (Other): Sealant that meets bond requirements when tested on substrates other than standard substrates, being glass, aluminum, mortar.
- b. Federal Specifications:
- 1) Type:
 - a) Type I: Self-leveling, pour grade.
 - (1) Compound which has sufficient flow to give smooth level surface when applied in horizontal joint at 40 deg F (4.4 deg C).
 - b) Type II: Non-sag, gun grade
 - (1) Compound which permits application in joints on vertical surfaces without sagging (slumping) at temperatures 40 deg F (4.4 deg C) and 122 deg. F (50 deg. C).
 - c) Type NS: Non-sag, gun grade.
 - (1) Non-sag shall be a compound which permits application in joints on vertical surfaces without sagging (slumping) at temperatures between -20 deg F and 122 deg. F (- 29 and 50 deg. C).
 - 2) Class:
 - a) Class A: Compounds resistant to 50 percent total joint movement (includes Type I and Type II).
 - (1) Capable of resisting compression-extension cycling of plus and minus 25 percent of nominal half inch width.
 - b) Class B: Compounds resistant to 25 percent total joint movement (includes Type I and Type II).
 - (1) Capable of resisting compression-extension cycling of plus and minus 12 1/2 percent of nominal half inch width.
10. Shelf Life: Period of time, usually beginning with date of manufacture, during which stored adhesive will remain effective or useful.
 11. Silicone: Any member of family of polymeric products whose molecular backbone is made up of alternating silicon and oxygen atoms and which has pendant hydrocarbon groups attached to silicon atoms. Used primarily as a sealant. Offers excellent resistance to water and large variations in temperature (minus 100 deg F to + 600 deg F) (minus 73.3 deg C to + 316 deg C).
 12. Stability: Ability of material to remain unchanged.

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

C. Reference Standards:

1. ASTM International:
 - a. ASTM C639-01(2011), 'Standard Test Method for Rheological (Flow) Properties of Elastomeric Sealants'.
 - b. ASTM C661-06(2011), 'Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer'.
 - c. ASTM C679-03(2009)e1, 'Standard Test Method for Tack-Free Time of Elastomeric Sealants'.
 - d. ASTM C719-93(2010), 'Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)'.
 - e. ASTM C794-10, 'Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants'.
 - f. ASTM C920-11, 'Standard Specification for Elastomeric Joint Sealants'.
 - g. ASTM C1135-00(2011), 'Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants'.
 - h. ASTM C1184-05, 'Standard Specification for Structural Silicone Sealants'.
 - i. ASTM C1193-11a, 'Standard Guide for Use of Joint Sealants'.
 - j. ASTM C1248-08, 'Standard Test Method for Staining of Porous Substrate by Joint Sealants'.
 - k. ASTM C1330-02(2007), 'Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants'.
 - l. ASTM C1481-12 'Standard Guide for Use of Joint Sealants with Exterior Insulation & Finish Systems (EIFS)'.
 - m. ASTM D412-06ae2, 'Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension'.
 - n. ASTM D2202-00(2010), 'Standard Test Method for Slump of Sealants'.
 - o. ASTM D2240-05(2010), 'Standard Test Method for Rubber Property-Durometer Hardness'.
2. Federal Specifications:
 - a. Federal Specification TT-S-001543A (CON-NBS), 'Sealing Compound: Silicone Rubber Base (for Caulking, Sealing & Glazing in Buildings and Other Structures)' (9 Jun 1971).
 - b. TT-S-00230C (CON-NBS), 'Sealing compound: Elastomeric Type, Single Component (For Caulking, Sealing, And Glazing In Buildings And Other Structures.' (2 Feb 1970).
3. Government Services Administration (GSA), Commercial Item Descriptions (CID):
 - a. GSA CID A-A-272A, 'Sealing Compound: Silicone Rubber Base (For Caulking, Sealing, and Glazing in Buildings and Other Structures)'.
 - b. GSA CID A-A-1556, 'Sealing Compound Elastomeric Type, Single Component (For Caulking, Sealing, and Glazing in Buildings and Other Structures)'.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Scheduling:

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

1.4 SUBMITTALS

A. Action Submittals:

1. Product Data:

- a. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - b. Manufacturer's literature for each Product.
 - c. Schedule showing joints requiring sealants. Show also backing and primer to be used.
- B. Informational Submittals:
1. Certificates:
 - a. Manufacturer's Certificate:
 - 1) Certify products are suitable for intended use and products meet or exceed specified requirements.
 - 2) Certificate from Manufacturer indicating date of manufacture.
 2. Manufacturers' Instructions:
 - a. Manufacturer's installation recommendations for each Product.
 - b. Manufacturer's installation for completing sealant intersections when different materials are joined.
 - c. Manufacturer's installation for removing existing sealants and preparing joints for new sealant.

1.5 QUALITY ASSURANCE

- A. Qualifications:
1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience.
 2. Applicator Qualifications:
 - a. Company specializing in performing work of this section.
 - b. Provide if requested, reference of projects with minimum three (3) years documented experience, minimum three (3) successfully completed projects of similar scope and complexity, and approved by manufacturer.
 - c. Designate one (1) individual as project foreman who shall be on site at all times during installation.
- B. Preconstruction Testing:
1. Pre-construction testing is not required when sealant manufacturer can furnish data acceptable to Architect based on previous testing for materials matching those of the Work.
- C. Mockups:
1. Provide mockups including sealant and joint accessories to illustrate installation quality and color if requested by Architect or Project Manager.
 - a. Incorporate accepted mockup as part of Work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
1. Deliver and keep in original containers until ready for use.
 2. Inspect for damage or deteriorated materials.
- B. Storage and Handling Requirements:
1. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).
 2. Handle to prevent inclusion of foreign matter, damage by water, or breakage.
 3. Store in a cool dry location, but never under 40 deg F (4 deg C) or subjected to sustained temperatures exceeding 90 deg F (32 deg C) or as per Manufacturer's written recommendations.
 4. Do use sealants that have exceeded shelf life of product.

1.7 FIELD CONDITIONS

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

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEMS

- A. Manufacturers:
1. Manufacturer Contact List:
 - a. Dow Corning Corp., Midland, MI www.dowcorning.com.
 - 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 C639 or ASTM D2202: Flow (sag or slump).
 - 3) ASTM C661 or ASTM D2240: Durometer hardness (shore A).
 - 4) ASTM C679 or ASTM C794: Tack free time.
 - 5) ASTM C719: Joint movement capability.
 - 6) ASTM C1135 or ASTM D412: Tensile adhesion strength.
 - 7) ASTM C1184: Structural silicone sealants.
 - 8) ASTM C1248: Staining.
 - 9) Federal Specification TT-S-001543A.
 - 10) Federal Specification TT-S-00230C.
 - 11) GSA CID A-A-272A.
 - 12) GSA CID A-A-1556.
 - b. Comply with Manufacturer's ambient condition requirements.
 - c. Sealants must meet Manufacturer's shelf-life requirements.
 - d. Sealants must adhere to and be compatible with specified substrates.
 - e. Sealants shall be stable when exposed to UV, joint movements, and particular environment prevailing at project location.
 - f. Primers (Concrete, stone, masonry, and other nonporous surfaces typically do not require a primer. Aluminum and other nonporous surfaces except glass require use of a primer.

- Installer Option to use Adhesion Test to determine if primer is required or use primer called out in related sections):
- 1) Adhesion Test:
 - a) Apply silicone sealant to small area and perform adhesion test to determine if primer is required to achieve adequate adhesion. If necessary, apply primer at rate and in accordance with Manufacturer's instructions. See 'Field Quality Control' in Part 3 of this specification for Adhesive Test.
 - 2) If Primer required, shall not stain and shall be compatible with substrates.
 - 3) Allow primer to dry before applying sealant.
 2. Sealants At Exterior 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) Connections.
 - b) EIFS to metal joints.
 - c) Louvers.
 - d) Masonry.
 - e) Parapet caps.
 - f) Wall penetrations.
 - g) 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 A, G, M.
 - 2) 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.
 - b. Design Criteria:
 - 1) Meet following standards for Sealant:
 - a) ASTM C920: Type S Grade NS, Class 25 (min) Use A.
 - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Dow Corning: 790 Silicone Building Sealant.
 - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2350 Silicone Elastomeric Sealant.
 - 3) Tremco: Tremsil 600 Silicone Sealant.
 4. General Interior Sealants:
 - a. General:
 - 1) Miscellaneous gaps between substrates.
 - b. Design Criteria:
 - 1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.

- 2) 100 percent silicone sealant.
- c. Non-Paintable Sealant (Installer Option A):
 - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - a) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
 - b) Laticrete: Latasil Silicone Sealant.
 - c) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2800 SilGlaze II Silicone Sealant.
 - d) Sherwin Williams: White Lightning Silicone Ultra Low Odor Window and Door Sealant.
 - e) Tremco: Tremsil 200 Silicone Sealant.
 - f) Franklin International: Titebond 2601 (White) 2611 (Clear) 100% Silicone Sealant.
- d. Paintable Sealant (Installer Option B):
 - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - a) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS7000 Paintable Silicone Sealant.

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 contaminants capable of affecting sealant bond to joint surface using manufacturer's recommended joint preparation methods.
 - b. Repair deteriorated or damaged substrates as recommended by Sealant Manufacturer to provide suitable substrate. Allow patching materials to cure.
 2. Surfaces shall be clean, dry, free of dust, oil, grease, dew, or frost. Prepare substrates in accordance with Manufacturer's instructions:
 - a. Porous surfaces: Abrasive-clean followed by blasting with oil-free compressed air.
 - b. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193.
 - c. High-pressure water cleaning: Exercise care that water does not enter through failed joints.
 3. Field test joints in inconspicuous location.
 - a. Verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.
 - b. When test indicates sealant adhesion failure, modify joint preparation primer, or both and retest until joint passes sealant adhesion test.
 4. Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.
- B. Joints:
1. Prepare joints in accordance with ASTM C1193.
 - a. Clean joint surfaces of 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 7000 HARDWARE

08 7101 COMMON FINISH HARDWARE REQUIREMENTS

08 7102 HANGING DEVICES

08 7103 SECURING DEVICES

08 7108 STOPS AND HOLDERS

08 7109 ACCESSORIES

08 9000 LOUVERS AND VENTS

08 9120 ARCHITECTURAL FIXED LOUVERS

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. Access Door Exit Device: See Exit Device.
2. Acoustic Seal: Attached to door to reduce external noise. Perimeter seals reduce potential for flanking noise, a term used to describe leakage of a sound across a barrier.
3. Active Door (or leaf): In paired or double doors, hinged door leaf that opens first and the one to which the lock is applied.
4. Astragal: Molding or strip whose purpose is to cover or close gap between edges of pair of doors. Astragals provide a weather or sound seal, minimize passage of light or retard passage of smoke or flame.
 - a. Overlapping Astragal: One-piece astragal attached to one door only and overlapping other door when in closed position.
 - b. Split Astragal: Two-piece astragal, one piece of which is surface mounted on each door and provided with means of adjustment to abut other piece and provide a seal.
5. Builders Hardware Manufacturer's Association (BHMA) Hardware Functions:
 - a. F-75 Passage Latch: Latch bolt operated by lever from either side at all times.
 - b. F-76 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. F-81 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. F-84 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. F-86 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. F-91 Store Door Lock: Deadlocking latch operated by either lever. Key in either lever locks / unlocks both levers.
 - g. E-2142 Deadbolt: Dead bolt operated by key from either side. Bolt automatically dead locks when fully thrown.
 - h. E-2152 Deadbolt: Dead bolt operated by key from outside and turn unit from inside. Bolt automatically dead locks when fully thrown.
6. Change Key: Key that operates only one cylinder or one group of keyed alike cylinders in a keying system.
7. Closer: Device or mechanism to control closing of swing door. May be overhead or floor mounted and either exposed or concealed.
8. Coordinator: Device or mechanism which controls order of closing of pair of swing doors; used with doors equipped with overlapping astragals and certain panic and fire exit hardware which requires inactive leaf to close before active leaf.
9. Cylinder: Cylindrical-shaped assembly (complete operating unit) containing tumbler mechanism and keyway (plug, shell, tumblers, springs and actuating device), into which key is inserted to operate lock and can only be actuated by correct key.

- a. Mortise: Threaded surface which screws directly into a lock case, with a cam engaging lock mechanism.
- b. Rim: Mounted on surface of door independently of lock, usually by screws from reverse side, and engaging with lock mechanism by means of tailpiece or metal extension.
10. Deadbolt (of a lock): Lock bolt having no spring action nor bevel, and which is operated by key or turn piece.
11. Dummy Trim: Trim only, without lock; usually used on inactive door in pair of doors.
12. Dust-Proof Strike: Strike with spring plunger that completely fills bolt hole when bolt is not projected.
13. Emergency Egress Exit Device: See Exit Device.
14. Exit Device: Latching mechanism for swinging doors designed to be operable in direction of egress travel and to provide exiting for occupants in emergency. Latching mechanism release through pressure on touch or cross bar mortised or mounted on push side of door. There are two classifications: Panic Exit Hardware and Fire Exit Hardware, and three types within each classification:
 - a. Mortise Type: Lock mechanism mortised into edge of door or concealed with door.
 - b. Rim Type: Lock mechanism mounted on interior face of door.
 - c. Vertical Rod: Surface or concealed, having latches in or on top and/or bottom of door and activated by cross bar through rod linkage extending vertically on or in lock stile of door.
15. Fire Exit Hardware: Metal device attached to back of door frame jamb at its base, to secure frame to the floor, may be either fixed or adjustable in height. See Exit Device.
16. Flush Bolt: Rods or bolts that are mounted flush with edge or face of inactive door to lock door to frame at head and/or sill. Flush bolt mounted in edge is operated by means of recessed lever. May be manual or automatic.
17. Grand Master Key: Key that operates locks in several groups, each of which has its own master key.
18. Handleset: Term describing lock trim with handle and thumbpiece on exterior of door, and knob/lever on interior.
19. Hardware: Any mechanism which is designed to perform operable function in use of door and frame.
20. Hinge: Two plates joined together by pin and attached to door and its frame whereby door is supported and is enabled to swing or move.
21. Holder: Device that holds door open at one or more selected positions.
22. Inactive Door (or leaf): Leaf of pair of doors that does not contain lock, but is bolted when closed, and to which strike is fastened to receive latch or bolt of active door.
23. Kick Plate: Protective plate applied on lower rail of door to prevent door from being marred.
24. Latch Bolt: Beveled spring bolt, usually operated when either knob or lever is turned, or when thumbpiece which operates handleset is pushed down.
25. Latchset: Non-locking device which contains only a latch bolt, a means of operating said latch and all required trim.
26. Leaf (of pair of doors): One of two doors forming pair of doors.
27. Lever Handle: Bar-like grip which is rotated about horizontal axis at one of its ends to operate a latch.
28. Lockset: Lock, complete with trim, such as knobs, escutcheons or handles.
29. Low-Energy Swing Door Operators: Device that operates swing door that opens or helps open door automatically, waits then closes it at reduced speed to levels deemed safe for disabled users. Commonly referred to as a Handicap door operator.
30. Master Key: Key that operates all master keyed locks or cylinders in group, each lock or cylinder usually operated by its own change key.
31. Mullion: Fixed or movable post dividing opening vertically.
32. Panic Exit Hardware: Hardware similar to Exit Hardware, but which has been tested and labeled for use only on emergency exit doors which are not fire doors. See Exit Device.
33. Passage Function: Knob or lever set most commonly used in hallways where locking feature is not required.
34. Pivot: Hinging device embodying fixed pin and single joint.
35. Pull: Handle of grip designed for attachment to door to facilitate opening and closing.
36. Push: Plate applied to lock stile to protect door against soiling and wear.
37. Single Cylinder Entrance Handleset: Key operates deadbolt from outside; turnpiece operates deadbolt from the inside.

38. Single Dummy: Knob/lever surface mounted on interior or exterior of door which does not turn any mechanism.
39. Silencer: Small piece of resilient material attached to stop on door frame to cushion closing of door.
40. Smoke Gasket: Brush seal used on doors to reduce passage of smoke and gasses.
41. Stop: Device to limit swing or movement of door at certain point.
42. Threshold: Strip fastened to floor beneath door, usually required to cover joint where two types of floor material meet.
43. Thumbpiece or Thumbturn: Lock trim component which typically is used to lock deadbolt from interior side of door.
44. Turnpiece: Small knob, lever or tee turn with spindle attached for operating deadbolt of lock or mortise bolt. Also termed Thumb Turn. Used only on single cylinder operations.
45. Weatherstrip: Material or device applied to door edges or to inner door frame edges to close clearance opening and minimize or restrict passage of air, moisture, sound, smoke, and/or dirt.

B. Reference Standards:

1. Builders Hardware Manufacturer's Association (BHMA):
 - a. BHMA A156.1, 'Butts and Hinges'.
 - b. BHMA A156.16, 'Auxiliary Hardware'.
 - c. BHMA A156.18, 'Materials and Finishes'.
 - d. BHMA A156.2, 'Bored and Preassembled Locks and Latches'.
 - e. BHMA A156.21, 'Thresholds'.
 - f. BHMA A156.22, 'Door Gasketing and Edge Seal Systems'.
 - g. BHMA A156.3, 'Exit Devices'.
 - h. BHMA A156.4, 'Door Controls - Closers'.
 - i. BHMA A156.5, 'Auxiliary Locks and Associated Products'.
 - j. BHMA A156.6, 'Architectural Trim'.
 - k. BHMA A156.7, 'Template Hinge Dimensions'.
 - l. BHMA A156.8, 'Door Controls – Overhead Stops and Holders'.

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 EXTERIOR DOORS

A. Single Exterior Doors:

1. **Group 1:**
 - a. 1 set: Weatherstrip.
 - b. 3 each: Hinges.
 - c. 1 each: Deadbolt, Function E-2152.
 - d. 1 each: Lockset Function F-86.
 - e. 1 each: Stop.
 - f. 1 each: Threshold.

END OF SECTION

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

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

1.2 REFERENCES

- A. Reference Standards:
 - 1. American Architectural Manufacturers Association / Window & Door Manufacturers Association / Canadian Standards Association:
 - a. AAMA/WDMA/CSA 101/I.S.2/A440-11, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.
 - 2. ASTM International:
 - a. ASTM A568/A568M-13a, 'Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
 - b. ASTM A653/A653M-13, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
 - 3. Steel Door Institute:
 - a. SDI A250.8-2003(R2008), 'Standard Steel Doors and Frames'.
 - b. SDI A250.11-2012, 'Recommended Erection Instructions for Steel Frames'.

1.3 SUBMITTALS

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

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Suppliers:
 - 1. Category One Approved VMR Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
 - a. Architectural Building Supply, Salt Lake City, UT Russ Farley Phone (800) 574-4369 FAX 801-484-6817 e-mail russf@absdoors.com.
 - b. Beacon Metals Inc, Salt Lake City, UT Jared Butler Phone (801) 486-4884, Cell (435) 216-2297, FAX 801-485-7647, e-mail Jared@beacon-metals.com.
- B. Manufacturers:
 - 1. Category One Approved Manufacturers. See Section 01 6200 for definitions of Categories.
 - a. Any current member of Steel Door Institute.
- C. Frames:
 - 1. Cold rolled furniture steel.

- a. 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 Manual'.
 - b. HMMA 860-09, '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 / Canadian Standards Association:
 - a. AAMA/WDMA/CSA 101/I.S.2/A440-11, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.
 - 2. ASTM International:
 - a. ASTM A568/A568M-13a, 'Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for'.
 - b. ASTM A653/A653M-13, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
 - c. ASTM C1036-11e, 'Standard Specification for Flat Glass'.
 - d. ASTM C1048-12e, 'Standard Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass'.
 - 3. Steel Door Institute:
 - a. SDI A250.8-2003(R2008), 'Standard Steel Doors and Frames'.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Suppliers:
 - 1. Category One Approved VMR Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
 - a. Architectural Building Supply, Salt Lake City, UT Russ Farley Phone (800) 574-4369 FAX 801-484-6817 e-mail russf@absdoors.com.
 - b. Beacon Metals Inc, Salt Lake City, UT Jared Butler Phone (801) 486-4884, Cell (435) 216-2297, FAX 801-485-7647, e-mail Jared@beacon-metals.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 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) Exterior doors galvanized and primed as per ASTM A653/A653M.
- 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.
 - 1) Construct UL fire doors and frames to meet UL's specific approval according to current procedure for door rating involved, Procedure No. R-3791 and R-3821 as listed by UL.
 - a) Labeling shall be in accordance with NFPA 80, the listing authority's policies and label materials, and shall identify Manufacturer.

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 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: Installation.
 - 2. Section 08 0601: Hardware Group Schedules.

1.2 REFERENCES

- A. Association Publications:
 - 1. Builders Hardware Manufacturers Association (BHMA), 355 Lexington Avenue, 15th Floor, New York, NY 10017-6603, Tel: 212-297-2122 Fax: 212-370-9047, www.buildershardware.com.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Hardware Templates:
 - a. Provide hardware templates to Sections 08 1213, 08 1313, and 08 1429 within 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 copies of Manufacturer's installation, adjustment, and maintenance instructions for each piece of hardware. Include one set in Operations And Maintenance Manual and send one 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 QUALITY ASSURANCE

- A. Qualifications:
1. Suppliers: Requirements of Section 01 4301 applies, but not limited to following:
 - a. Shall have two years minimum experience in providing, detailing, scheduling, and installing builders hardware and shall employ at least one full time DHI Architectural Hardware Consultant (AHC).

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 SUPPLIERS

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

2.2 FINISHES

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

2.3 FASTENERS

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

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before ordering materials, examine documents to be assured that material to be ordered is appropriate for 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, New Britain, CT www.stanleyworks.com.
- B. Hinges:
 - 1. Sizes:
 - a. **1-3/4 inch (45 mm)** doors and fire-rated doors in metal frames:
 - 1) Standard: **4-1/2 inches by 4-1/2 inches (115 mm by 115 mm)**.
 - 2) Wide Throw: **4-1/2 inches (115 mm)** by width required.
 - 2. Use non-removable pins on exterior opening doors.
 - 3. 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. Deadbolts.
 - c. Cylinders.
- B. Related Requirements:
 - 1. Section 08 7101: Common Hardware Requirements.

1.2 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Manufacturers:
 - 1. Manufacturer List:
 - a. Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
 - b. Best Locks by Stanley, Indianapolis IN www.stanleysecuritysolutions.com.
 - c. Hager, St Louis, MO www.hagerhinge.com.
 - d. Ives, New Haven, CT www.iveshardware.com.
 - e. Knape & Vogt, Grand Rapids, MI www.knapeandvogt.com.
 - f. Precision Hardware, Romulus, MI www.precisionhardware.com.
 - g. Rockwood, Manufacturing Co, Rockwood, PA www.rockwoodmfg.com.
 - h. Sargent, New Haven, CT www.sargentlock.com.
 - i. Schlage, Colorado Springs, CO www.schlage.com.
 - j. Von Duprin, Indianapolis, IN www.vonduprin.com.
 - k. 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. Lever Operated:
 - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) 7K Series Best Lock by Stanley standard cylinders - (I/C cores may be used when authorized by PFD HQ).
 - 2) 7 Series by Sargent.
 - 3) AL Series by Schlage.
 - 4) 5300LN by Yale.

- D. Deadbolts:
 - 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Match manufacturer of locksets.

- E. Standard Cylinders:
 - 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
 - a. Match Manufacturer of locksets.
 - 2. Other Cylinders: Provide cylinders for overhead door in Storage Building, coiling counter doors, mesh partition doors, locking accordion folding partitions, locking folding panel partitions, and for interior exit devices requiring cylinders.
 - 3. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
 - a. Match Manufacturer of locksets.

PART 3 - EXECUTION

3.1 CLOSE-OUT ACTIVITIES

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

END OF SECTION

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

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

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Glynn-Johnson, Indianapolis, IN www.glynn-johnson.com.
 - 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. Glynn Johnson	---	---	---	GJ 90S
c. Sargent	---	---	---	590S Series
d. Equal as approved by Architect before Installation. See Section 01 6200.				

PART 3 - EXECUTION**3.1 INSTALLATION**

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

END OF SECTION

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

- A. Products Furnished But Not Installed Under This Section:
 - 1. Thresholds (metal) where required for wood doors and hollow metal doors.
 - 2. Weatherstripping for exterior hollow metal doors.
 - 3. 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 A156.18-2006, 'Materials and Finishes'.
 - b. ANSI / BHMA A156.21-2009, '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. Thresholds:
 - 1. Type One Acceptable Products:
 - a. Interior Doors at Acoustic Seals, Approved Products:
 - 1) Carpet Both Sides:
 - a) 505S-DBA by Hager.
 - b) 414DKB by NGP.
 - c) 236D by Pemko.
 - 2) Carpet / Concrete, Wood, or Resilient Flooring:

- a) 504S-DBA by Hager.
 - b) 417DKB by NGP.
 - c) 174D by Pemko.
 - 3) Concrete, Wood, or Resilient Flooring Both Sides:
 - a) 418S-DBA by Hager.
 - b) 411DKB by NGP.
 - c) 151D by Pemko.
 - b. Out swinging Exterior Doors, Approved Products:
 - 1) 560SV by Hager.
 - 2) 425 by NGP.
 - 3) 185AV by Pemko.
 - c. In swinging Exterior Doors, Approved Products:
 - 1) 602A with 770S Rain Drip and 713SA Surface Hook by Hager.
 - 2) 345 with 15D Rain Drip and 81A Surface Hook by NGP.
 - 3) 110A with 345 Rain Drip and 66A Surface Hook by Pemko.
 - d. Equals as approved by Architect before bidding. See Section 01 6200.
- C. Weatherstripping:
- 1. Type One Acceptable Products:
 - a. Finish: clear anodized aluminum.
 - b. Perimeter:
 - 1) 800S by Hager.
 - 2) A625A by NGP.
 - 3) 35041CP by Pemko.
 - c. Bottom:
 - 1) 750S CLR or 754S CLR by Hager.
 - 2) 198NA by NGP.
 - 3) 321CN by Pemko.
 - d. Equal as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION

END OF SECTION

SECTION 08 9120**ARCHITECTURAL FIXED LOUVERS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
 - 1. Aluminum architectural louvers.
- B. Related Requirements:
 - 1. Section 06 2001: Installation in framing and brick veneer masonry.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Acceptable Manufacturers:
 - 1. Airolite, Marietta, OH www.airolite.com or Airolite/E H Price Ltd, Winnipeg, MB (204) 669-4220.
 - 2. American Warming & Ventilating, Holland, OH www.american-warming.com or American Warming & Ventilating/Farr Inc, Laval, QB (450) 629-3030.
 - 3. Arrow United Industries, Wyalusing, PA www.arrowunited.com or American Warming & Ventilating/Farr Inc, Laval, QB (450) 629-3030.
 - 4. Carnes, Verona, WI www.carnes.com.
 - 5. Industrial Louvers, Delano, MN www.industriallouvers.com.
 - 6. Ruskin Manufacturing, Grandview, MO www.ruskin.com.
 - 7. Vent Products, Chicago, IL www.ventprod.com.
 - 8. Wonder Metals Corp, Redding, CA www.wondermetals.com.
 - 9. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Weather-Proof Wall Louvers:
 - 1. 6063 T5 aluminum.
 - 2. Metal thickness minimum:
 - a. **0.050 inch (1.27 mm)**: Louvers up to **24 inches (600 mm)** square.
 - b. **0.081 inch (2.06 mm)**: Louvers over **24 inches (600 mm)** either dimension.
 - 3. Flange type frame.
 - 4. Louvers shall be sloped and shaped to prevent penetration of driving rains or snow.
 - 5. Screens: 14x18 aluminum mesh.
 - 6. Finish:
 - a. Kynar 500 or Hylar 5000, color as selected by Architect.
 - b. Class Two Quality Standard: K638 by Airolite

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

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DIVISION 09: FINISHES

09 9000 PAINTS AND COATINGS

- 09 9001 COMMON PAINTING AND COATING REQUIREMENTS
- 09 9112 EXTERIOR PAINTED FERROUS METAL
- 09 9113 EXTERIOR PAINTED GALVANIZED METAL
- 09 9125 INTERIOR PAINTED WOOD
- 09 9321 INTERIOR SEALED CONCRETE FLOORS

END OF TABLE OF CONTENTS

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SECTION 09 9001**COMMON PAINTING AND COATING REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Common procedures and requirements for field-applied painting and coating.
- B. Related Requirements:
1. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of shop priming of steel and iron.
 2. Section 07 9213: 'Elastomeric Joint Sealants' for quality of Elastomeric Joint Sealants.
 3. Sections under 09 9000 heading 'Paints and Coatings'.
 - a. Pre-Installation conferences held jointly with Section 09 9001.

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.

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. Paint mechanical, electrical, and audio/visual items that require field painting as indicated in Contract Documents. These include but are not limited to:
 - a. Gas pipe from gas meter into building.
 - b. Mechanical flues and pipes penetrating roof.
 - c. Electrical panel and disconnect enclosures.

- d. Metal protective structures for refrigerant lines.
 3. Metal reveals at ceiling access doors.
 4. Paint inside of chases in occupied spaces flat black for **18 inches (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

SECTION 09 9112**EXTERIOR PAINTED FERROUS METAL****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Preparing and painting 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'.
 - 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.
- 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).
 - 2. Traffic signage:
 - a. Primer Coat: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
 - b. Finish Coats: MPI Product 163, 'Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5).

PART 3 - EXECUTION**3.1 APPLICATION**

- A. General: See appropriate paragraphs of Section 09 9001.
- B. New Surfaces: Clean metal to be painted of rust, mill scale, grease, oil, and welding spatters, burrs, flux, slag, and fume. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying primer coat.
- 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 and 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. Handrails And Exposed Miscellaneous Structural Steel:
 - a. New Surfaces: Use MPI(a) EXT 5.3D Pigmented Polyurethane Finish system.
 - b. Previously Finished Work: Use MPI(r) REX 5.3D Pigmented Polyurethane Finish system.
 - 2. 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 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)'.
 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.

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 9321**INTERIOR SEALED CONCRETE FLOORS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Seal concrete floors that are to be left exposed in finished building 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. System: Use MPI(a) INT 3.2F or 3.2G Finish systems.
- C. Performance:
 - 1. Design Criteria:
 - a. Use MPI Custom Grade requirements.
- D. Materials:
 - 1. MPI Products 99, 'Sealer, Water Based, for Concrete Floors'.
or
 - 2. MPI Products 104, 'Sealer, Solvent Based, for Concrete Floors'.

PART 3 - EXECUTION**3.1 APPLICATION**

- A. See appropriate paragraphs of Section 09 9001.

END OF SECTION

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DIVISION 10: SPECIALTIES

10 1000 INFORMATION SPECIALTIES

10 1453 TRAFFIC SIGNAGE

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SECTION 10 1453**TRAFFIC SIGNAGE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnishing and installing of exterior post-mounted site signage as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 03 3053: 'Miscellaneous Exterior Cast-In-Place Concrete' for quality requirements of concrete used for parking sign posts.
 - 2. Section 05 0503: 'Shop-Applied Metal Coatings' for powder coated finishing of posts.
 - 3. Section 05 1223: 'Structural Steel For Buildings' for tube steel posts.

1.2 REFERENCES

- A. Reference Standards:
 - 1. International Code Council / American National Standards Institute:
 - a. ICC/ANSI A117.1-2010, 'Accessible and Usable Buildings and Facilities'.
 - 2. U.S. Department of Justice:
 - a. 2010 'ADA Standards for Accessible Design'.

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 - 1. Sign shall meet ANSI A117.1 accessibility code and ADA standards for accessible design and local and state authorities having jurisdiction (AHJ) requirements.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Permanently Mounted:
 - 1. Post Foundation Concrete: One cu ft cement, **2 cu ft (0.0566 cu m)** sand, **4 cu ft (0.1132 cu m)** gravel, and **5 gallons (18.93 liters)** minimum to **6 gallons (22.71 liters)** maximum of water.
 - 2. Accessible Parking Signs:
 - a. Design Criteria:
 - 1) Meet regulatory agency requirements for accessibility.
 - 2) Sign graphics and lettering shall be minimum required by agency having jurisdiction:
 - a) International symbol of accessibility should be posted on all accessible parking spaces.
 - b) Letters must contain visual characters and high dark to light contrast between characters and background as per ADA requirements:
 - c) Provide reflective background.
 - d) Van-accessible parking spaces to have additional 'text' or 'sign' below the accessibility symbol to mark the van-accessible area specifically:
 - 3) Size: **12 inches (305 mm)** x **18 inches (457 mm)** aluminum sign.

- 4) Sign shall have rounded corners.
3. Posts:
 - a. Handicap Accessible Parking Signage:
 - 1) Provide 8" x 2" TS steel post as shown on contract drawings.
 - 2) Factory-applied powder coat finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Permanently Mounted:
 1. Locate as shown on Site Plan.
 - a. Follow ADA guidelines and local and state authorities having jurisdiction (AHJ) for placement of sign requirements:
 - 1) Van accessible sign should be placed so that it is not obscured by anything including a standing van, vehicle or other obtrusive objects.
 - 2) Signs should be placed at such a height (at least **60 inches (1 500 mm)** above surface) that they do not get obscured by any parked vehicles or other obstructions. Signs must be viewable from drivers' seat of vehicle and located right in view of parking spaces.
 2. Install signs square and plumb.
 3. Post Foundations:
 - a. Follow requirements of Section 03 3053: 'Miscellaneous Exterior Cast-In-Place Concrete' for post foundation:
 - 1) Mix concrete components thoroughly, place in post foundation holes sized as shown on Contract Drawings.
 - b. Mow Strips:
 - 1) At mow strips where shown on Site Plan, set top of post foundation below grade sufficient to allow for placing of mow strip.
 - c. Placement Before Installation of Slabs:
 - 1) Measure post foundation depth from top of slab. Extend bottom of slab footing sufficient to allow specified amount of concrete around post.
 - d. Placement After Installation of Slabs:
 - 1) Where posts are installed after installation of slabs, core slab width of foundation diameter as shown on Contract Documents to accommodate post foundation.
 4. Handicap Accessible Parking Signage:
 - 1) Attach sign to galvanized steel posts as shown on Contract Drawings with stainless steel self tapping screws.
 - 2) Isolate dissimilar materials (steel tube and aluminum sign).

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 0526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
- 26 0533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
- 26 0613 ELECTRICAL EQUIPMENT MOUNTING HEIGHT SCHEDULE

26 2000 LOW-VOLTAGE ELECTRICAL TRANSMISSION

- 26 2417 CIRCUIT-BREAKER PANELBOARDS
- 26 2726 WIRING DEVICES
- 26 2816 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

26 5000 LIGHTING

- 26 5100 INTERIOR LIGHTING
- 26 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.

1.2 REFERENCES

- A. Reference Standards:
 - 1. National Fire Protection Association / American National Standards Institute:
 - a. NFPA 70-2011, National Electric Code (NEC).
 - 2. National Electrical Manufacturing Association Standards (NEMA):
 - a. NEMA 250-2008, '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.
- 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' for lighting control equipment.
 - 2) Section 26 2816: 'Enclosed Switches And Circuit Breakers'.
 - 3) Section 26 5100: 'Interior Lighting Fixtures'.
 - 4) Section 26 5200: 'Emergency Lighting' for battery units.
 - c. Do not purchase equipment before approval of product data.
 - 2. Shop Drawings:
 - a. Indicate precise equipment to be used, including all options specified. Indicate wording and format of nameplates where applicable. Submit in three-ring binder with hard cover.
- B. Informational Submittals:
 - 1. Test And Evaluation Reports:
 - a. Report of site tests, before Substantial Completion.

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 and match existing equipment:
 - 1) 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.

1.2 REFERENCES

- A. Definitions:
 - 1. Line Voltage: Over 70 Volts.

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Line Voltage Conductors:
 - 1. Copper with AWG sizes as shown:
 - a. Minimum size shall be No. 12 except where specified otherwise.
 - b. Conductor size No. 8 and larger shall be stranded.
 - 2. Insulation:
 - a. Standard Conductor Size No. 10 And Smaller: 600V type THWN or XHHW (75 deg C).
 - b. Standard Conductor Size No. 8 And Larger: 600V Type THW, THWN, or XHHW (75 deg C).
 - c. Higher temperature insulation as required by NEC or local codes.
 - 3. Colors:
 - a. 208Y / 120 V System:
 - 1) Black: Phase A.
 - 2) Red: Phase B.
 - 3) Blue: Phase C.
 - 4) Green: Ground.
 - 5) White: Neutral.
 - b. 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 Drawings. Run conductors of different voltage systems in separate conduits.
2. Route circuits at own discretion, however, circuiting shall be as shown in Panel Schedules. Group circuit homeruns to panels as shown on Drawings.
3. Neutrals:
 - a. On three-phase, 4-wire systems, do not use common neutral for more than three circuits.
 - b. On single-phase, 3-wire systems, do not use common neutral for more than two circuits.
 - c. Run separate neutrals for each circuit where specifically noted on Drawings.
 - d. Where common neutral is run for two or three home run circuits, connect phase conductors to breakers in panel which are attached to separate phase legs so neutral conductors will carry only unbalanced current. Neutral conductors shall be of same size as phase conductors unless specifically noted otherwise.
4. Pulling Conductors:
 - a. Do not pull conductors into conduit until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
 - b. Do not use heavy mechanical means for pulling conductors.
 - c. Use only listed wire pulling lubricants.

C. Line Voltage Cables:

1. Route circuits at own discretion, however, circuiting and numbering shall be as shown in Panel Schedules.
2. Support cables using approved staples, cable ties, straps, hangers, or similar fittings, spaced as required.
3. Where installing in framing, do not bore holes in joists or beams outside center 1/3 of member depth or within **24 inches (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

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 03 3111: 'Normal Weight Structural Concrete'.
 - a. Pre-installation conference held jointly with other concrete related sections.
 - 2. Section 26 0501: 'Common Electrical Requirements'.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in pre-installation conference as specified in Section 03 3111.
 - 2. In addition to agenda items specified in Section 01 3100 and 31 3111, review following:
 - a. Review Architect's inspection of grounding conductor installation before placement of concrete.

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals: Requirements of Section 27 1501 applies, but is not limited to following:
 - 1. Cable assemblies shall be UL / CE Listed and CSA Certified. Cables shall be a distinctive green or green/yellow in color, and all jackets shall be UL, VW-1 flame rated.
 - 2. Grounding shall conform to all required Commercial Building Grounding and Bonding Requirements for Telecommunications, Electrical Codes, and Manufacturer's grounding requirements.
- 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.
- C. Materials:
 1. Grounding And Bonding Jumper Conductors: Bare copper or with green insulation.
 2. Make grounding conductor connections to ground rods and water pipes using approved bolted clamps listed for such use.
 3. Service Grounding Connections And Cable Splices: Make by exothermic process.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Interface With Other Work: Coordinate with Section 03 3111 in installing grounding conductor and placing concrete. Do not allow placement of concrete before Architect's inspection of grounding conductor installation.
- B. Grounding conductors and bonding jumper conductors shall be continuous from terminal to terminal without splice. Provide grounding for following.
 1. Electrical service, its equipment and enclosures.
 2. Conduits and other conductor enclosures.
 3. Neutral or identified conductor of interior wiring system.
 4. Main panelboard, power and lighting panelboards.
 5. Non-current-carrying metal parts of fixed equipment such as motors, starter and controller cabinets, instrument cases, and lighting fixtures.
- C. Grounding connection to main water supply shall be accessible for inspection and made within **6 inches (150 mm)** of point of entrance of water line to building. Provide bonding jumpers across water meter and valves to assure electrical continuity.
- D. 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.
- E. 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.
- F. 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.
- G. Provide grounding bushings on all feeder conduit entrances into panelboards and equipment enclosures.
- H. Bond conduit grounding bushings to enclosures with minimum #10 AWG conductor.
- I. 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.
- J. Run separate insulated grounding cable from each equipment cabinet to electrical panel. Do not use intermediate connections or splices. Affix directly to cabinet.
- K. On motors, connect ground conductors to conduit with approved grounding bushing and to metal frame with bolted solderless lug.

- L. Ground cabinet of transformers to conduit and ground wires, if installed. Bond transformer secondary neutral conductor to cabinet.

3.2 FIELD QUALITY CONTROL

- A. Field Inspections:
 - 1. Notify Architect for inspection two (2) days minimum before placing concrete over grounding conductor.

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.
 3. Furnish and install air-vapor barrier boxes as described in Contract Documents.
 4. Furnish and install main electrical service raceway as described in Contract Documents and comply with electrical utility company requirements.
 5. Furnish and install main telephone service raceway as described in Contract Documents and comply with telephone company requirements.
- B. Related Requirements:
1. Section 26 0501: 'General Electrical Requirements'.

PART 2 - PRODUCTS**2.1 SYSTEM**

- A. Manufacturers:
1. Manufacturer Contact List:
 - a. Cooper B-Line, Highland, IL www.b-line.com.
 - 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: Sealtite type.
 - f. Expansion fittings shall be equal to OZ Type AX sized to raceway and including bonding jumper.
 - g. Prohibited Fitting Materials:
 - 1) Crimp-on, tap-on, indenter type fittings.
 - 2) Cast set-screw fittings for EMT.
 - 3) Spray (aerosol) PVC cement.
- 3. Seal Devices: OZ Type WSK.
- 4. Outlet Boxes:
 - a. Galvanized steel of proper size and shape are acceptable for all systems. Where metal boxes are used, provide following:
 - 1) Provide metal supports and other accessories for installation of each box.
 - 2) Equip ceiling and bracket fixture boxes with fixture studs where required.
 - 3) Equip outlets in plastered, paneled, and furred finishes with plaster rings and extensions to bring box flush with finish surface.
 - b. Non-metallic boxes may be used only for control voltage wiring systems.
 - c. Telephone / data outlet boxes shall be single device outlet boxes.
 - d. HVAC Instrumentation And Control:
 - 1) Junction boxes in mechanical equipment areas shall be **4 inches (100 mm)** square.
 - 2) Boxes for remote temperature sensor devices shall be recessed single device.
 - 3) Boxes for thermostats shall be **4 inches (100 mm)** square with raised single device cover.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. 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. Conduit And Raceway:
1. Conceal raceways within ceilings, walls, and floors, except at Contractor's option, conduit may be exposed on walls or ceilings of mechanical equipment areas and above acoustical panel suspension ceiling systems. Install exposed raceway runs parallel to or at right angles to building structure lines.
 2. Keep raceway runs **6 inches (150 mm)** minimum from hot water pipes.
 3. Make no more than four quarter bends, 360 degrees total, in any conduit run between outlet and outlet, fitting and fitting, or outlet and fitting.
 - a. Make bends and offsets so conduit is not injured and internal diameter of conduit is not effectively reduced.
 - b. Radius of curve shall be at least minimum indicated by NEC.
 4. Cut conduit smooth and square with run and ream to remove rough edges. Cap raceway ends during construction. Clean or replace raceway in which water or foreign matter have accumulated.
 5. 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.
 6. Installation in Concrete:
 - a. Install no conduit in concrete unless outside diameter is less than 1/3 of slab, wall, or beam thickness in which it is embedded.
 - b. Position conduits in center of concrete below reinforcing steel, and separated by minimum lateral spacing of three diameters.
 - c. Elbows embedded in concrete shall be rigid steel or IMC and stubouts from concrete slabs shall extend **3 inches (75 mm)** minimum before making connection to EMT.
 - d. Separate conduits penetrating structural slabs in buildings by **2 inches (50 mm)** minimum.
 - e. Install seal device where underground raceways penetrate concrete building wall.
 7. 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.
 8. Underground Raceway And Conduit:
 - a. Bury underground raceway installed outside building **24 inches (600 mm)** deep minimum.
 - b. Bury underground conduit in planting areas **18 inches (450 mm)** deep minimum. It is permissible to install conduit directly below concrete sidewalks, however, conduit must be buried **18 inches (450 mm)** deep at point of exit from planting areas.
- C. Telephone / Data Systems:
1. Install raceway from terminal board to each telephone and data outlet as indicated on Drawings.
- 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 Drawings. Verify door swings shown on electrical drawings with architectural drawings, and

report discrepancies to Architect before rough-in. Distance of box from jamb shall be within 6 inches (150 mm) of door jamb.

- b. Properly center boxes located in walls with respect to doors, panels, furring, trim and consistent with architectural details. Where two or more outlets occur, space them uniformly and in straight lines with each other, if possible.
 - c. Center ceramic tile boxes in tile.
- 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 (450 mm).
 - b. Wall Switches: 42 inches (1 065 mm).
 - c. Wall-Mounted Exit Lights: 90 inches (2 285 mm).
 - d. Emergency Lighting Units: 60 inches (1 525 mm).
 2. Communications
 - a. Sound Distribution System Components: As indicated on Drawings.
 - b. Satellite Distribution System Components: As indicated on Drawings.
 - c. TV Distribution System Components: As indicated on Drawings.
 - d. Computer and TV: 18 inches (450 mm).
 - e. Telephone / Data Terminal Boards: 72 inches (1 800 mm) to top.
 - f. Telephones (wall type): 60 inches (1 500 mm).
 - g. Telephones (desk type): 18 inches (450 mm).
 - h. Telephone / Data (desk type): 18 inches (450 mm).
 - i. Data (desk type): 18 inches (450 mm).

END OF SECTION

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SECTION 26 2417**CIRCUIT-BREAKER PANELBOARDS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install circuit-breaker panelboards as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 26 0501: 'Common Electrical Requirements'.
 - 2. Section 26 4301: 'Surge Protection Devices'.

PART 2 - PRODUCTS**2.1 EQUIPMENT**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Cutler-Hammer Inc, Pittsburgh, PA www.eatonelectric.com.
 - b. General Electric Industrial Systems, Charlotte, NC www.geindustrial.com.
 - c. Siemens Energy & Automation, Alphrata, GA www.sea.siemens.com.
 - d. Square D Co, Palatine, IL www.us.squared.com.
- B. Performance:
 - 1. Capacities:
 - a. Panelboard:
 - 1) Minimum integrated equipment short circuit rating of 22,000 amperes for 120 / 208 Volts.
 - 2) Minimum integrated equipment short circuit rating of 50,000 amperes for 277 / 280 Volts.
 - 3) Rated for use as service entrance equipment.
 - b. Lighting And Appliance Panelboards:
 - 1) Minimum integrated equipment short circuit rating of 10,000 amperes for 120 / 208 Volts.
 - 2) Minimum integrated equipment short circuit rating of 14,000 amperes for 277 / 480 Volts.
 - c. Load Centers:
 - 1) 125 Amp main lugs, 120 / 208 Volt, three-phase.
 - 2) Minimum integrated equipment short circuit rating of 10,000 Amps.
- C. Material:
 - 1. Circuit-breaker type.
 - 2. Galvanized steel cabinets
 - 3. Bussing and lugs arranged as required.
 - 4. Multi-pole circuit-breakers shall be common trip.
 - 5. Circuit-breakers shall be molded case thermal magnetic type with inverse time characteristics.
 - 6. Lighting And Appliance Panelboards:
 - a. Plug-on or bolt-on breakers. Multi-pole breakers shall be common trip.
 - b. Factory installed or provided circuit number identification for each breaker and space.
 - c. Cabinets shall be locking type with no exposed latches or screws when door is closed. Key panels alike and provide minimum of three keys.
 - d. Minimum dimensions of 20 inches (500 mm) wide by 5-3/4 inches (146 mm) deep.

- e. Space designation on Drawings indicates bus hardware and panelboard capacity for future acceptance of one 20 Amp, single-pole circuit-breaker.
 - f. Breakers specified to be shunt trip and shall include shunt trip accessories to remotely trip breaker using separate 120 V power source. Trip coil shall include coil-clearing contact to break coil current when breaker opens.
 - g. Use equipment from same manufacturer as main panelboard.
 - h. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Type PRL1a by Cutler-Hammer.
 - 2) Type AL or AQ by General Electric.
 - 3) Type P1 by Siemens.
 - 4) Type NQOD by Square D.
7. Load Centers:
- a. Surface-mounted, outdoor NEMA Type 3R enclosure with padlocking provisions. 12-1/2 inches (318 mm) wide by 4-1/2 inch (115 mm) deep minimum.
 - b. HACR type circuit breakers.
 - c. Use equipment from same manufacturer as main panelboard.
 - d. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Type CH by Cutler-Hammer.
 - 2) Type PowerMark Plus by General Electric.
 - 3) Type PL by Siemens.
 - 4) Type QO by Square D.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Label panelboards, load centers, and each breaker in main panelboard with 1/16 inch (1.6 mm) thick laminated plastic composition material with contrasting color core. Engraved letters shall be 1/4 inch (6 mm) high.
- B. Provide typewritten circuit schedules in lighting and distribution panelboards and load centers to identify panelboard and load served by each branch breaker.
- C. Arrange conductors neatly within panelboards and load centers.
- D. Secure to structure in accordance with requirements of Project seismic design category.

3.2 PROTECTION

- A. Protect panelboards, load centers, and interior components from paint, gypsum board compound, dirt, dust, and other foreign matter during construction.

END OF SECTION

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

- A. Includes But Not Limited To:
 - 1. Furnish and install wiring devices complete with plates as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 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. 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.
 - h. Lightolier Controls, Dallas, TX www.lolcontrols.com or Lightolier CFI, Lachine, QB (800) 565-5486 or (514) 636-0670.
 - i. Lutron Electronics Co Inc, Coopersburg, PA www.lutron.com.
 - j. Novitas Inc, Peachtree City, GA www.novitas.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. Red Dot div of Thomas & Betts, Memphis, TN www.tnbcom.
 - o. Sensorswitch, Wallingford, CT www.sensorswitch.com.
 - p. Siemon Company, Watertown, CT www.siemon.com.
 - q. Square D Co, Palatine, IL www.squared.com.
 - r. Suttle, Hector, MN www.suttleonline.com.
 - s. Tork Inc, Mount Vernon, NY www.tork.com.
 - t. 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. Match Existing.
 - 2. Standard Style:
 - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

- 1) 20 AMP, single pole:
 - a) Cooper: 2221V.
 - b) Hubbell: HBL1221-I.
 - c) Pass & Seymour: 20AC1-I.
 - d) Leviton: 1221-2I.
 - 2) Two Pole:
 - a) Cooper: 2222V.
 - b) Hubbell: HBL1222-I.
 - c) Pass & Seymour: 20AC2-I.
 - d) Leviton: 1222-2I.
 - 3) Three Way:
 - a) Cooper: 2223V.
 - b) Hubbell: HBL1223-I.
 - c) Pass & Seymour: 20AC3-I.
 - d) Leviton: 1223-2I.
 - 4) Four Way:
 - a) Cooper: 2224V.
 - b) Hubbell: HBL1224-I.
 - c) Pass & Seymour: 20AC4-I.
 - d) Leviton: 1224-2I.
 - 5) Pilot Switch:
 - a) Hubbell: HBL1221-PL.
 - b) Pass & Seymour: 20AC1-RPL.
 - c) Leviton: 1221-PLR.
 - 6) Lighted Toggle Switch:
 - a) Single Pole:
 - (1) Cooper: 2221-LTV.
 - (2) Hubbell: HBL1221-IL.
 - (3) Pass & Seymour: 20AC1-ISL.
 - (4) Leviton: 1221-LHI.
 - b) Three Way:
 - (1) Cooper: 2223-LTV.
 - (2) Hubbell: HBL1223-IL.
 - (3) Pass & Seymour: 20AC3-ISL.
 - (4) Leviton: 1223-7LC.
3. Standard Style:
- a. 15 AMP, specification grade, back and side wired, self grounding, tamper resistant.
 - b. Verified by UL to meet Fed Spec WC-596F.
 - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Cooper: TR5262.
 - 2) Hubbell: BR20.
 - 3) Leviton: TBR20.
 - 4) Pass & Seymour: TR20.
4. 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.
- C. Occupancy Sensors:
1. Ceiling, dual technology type.
 - a. Complete with sensor and relay / transformer.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Cooper Controls:
 - a) Sensor: OAC-DT-0501.
 - b) Relay / Transformer: SP20-MV.
 - 2) Hubbell:
 - a) Sensor: OMNIDT500.

- b) Relay / Transformer: UVPP.
 - 3) Leviton:
 - a) Sensor: OSC05-RMW.
 - b) Relay / Transformer: OSP20-0D0.
 - 4) Pass & Seymour:
 - a) Sensor: CSD1000.
 - b) Relay / Transformer: PWP2120.
 - 5) Sensorswitch:
 - a) Sensor: CMPDT9.
 - b) Relay / Transformer:
 - 6) Watt Stopper:
 - a) Sensor: DT-305.
 - b) Relay / Transformer: BZ-50.
2. Wall, dual technology type
- a. Provide model compatible with ceiling sensor provided above.

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 2816**ENCLOSED SWITCHES AND CIRCUIT BREAKERS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install disconnects as described in Contract Documents, except those provided integral with equipment.
- B. Related Requirements:
 - 1. Section 26 0501: Common Electrical Requirements.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.
 - a. Disconnects: Same as Manufacturer of Project's main panelboard.
 - b. Fuses.
 - 1) Cooper Bussmann, Ellisville, IL www.cooperbussmann.com.
 - 2) Edison Fuse, Ellisville, IL (314) 391-3443.
 - 3) Ferraz Shawmut, Newburyport, MA www.ferrazshawmut.com.
 - 4) Littelfuse Inc, Des Plaines, IL www.littelfuse.com.
- B. Disconnects:
 - 1. Heavy-duty quick-make, quick-break type, non-fused unless indicated otherwise.
 - 2. Provide interlock to prevent opening of door when switch is in ON position.
 - 3. Provide means to lock switch in OFF position with padlock.
 - 4. Disconnects for motor circuits shall be horsepower rated.
 - 5. Enclosures:
 - a. Interior: NEMA / CEMA Type 1.
 - b. Exterior: NEMA / CEMA Type 3R.
 - 6. Fuses:
 - a. Fuse fused disconnects with dual-element time delay fuses and equip with rejection type fuse holders.
 - b. Fuses on Project shall be from single manufacturer.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Label disconnects to indicate equipment served, such as Condensing Unit CU-1. Use **1/16 inch (1.6 mm)** thick laminated plastic composition material with contrasting color core. Engraved letters shall be **1/4 inch (6 mm)** high. Attach labels with screws.

END OF SECTION

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SECTION 26 5100
INTERIOR LIGHTING

PART 1 - GENERAL**1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install lighting system as described in Contract Documents, complete with lamps.
- B. Related Requirements:
 - 1. Section 26 0501: Common Electrical Requirements.
- C. Reference Standards:
 - 1. Federal Communications Commission (FCC):
 - a. Code of Federal Regulations (CFR):
 - 1) FCC 47 CFR Part 18, 'Industrial, Scientific, and Medical Equipment.'
 - 2. Institute of Electrical and Electronics Engineers (IEEE) / American National Standards Institute (ANSI):
 - a. IEEE / ANSI C62.41.1-2002, 'Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits.'

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Advance Transformer Co, Rosemont, IL www.advancetransformer.com.
 - b. Cooper Wiring Devices by Eaton, Peachtree City, GA www.cooperindustries.com.
 - c. General Electric Lighting, Hendersonville, NC or General Electric Lighting Canada Inc, Mississauga, ON www.gelighting.com/na.
 - d. Howard Lighting Products, Laurel, MS www.howard-ind.com.
 - e. Novitas Inc, Peachtree City, GA www.novitas.com.
 - f. Osram Sylvania, Danvers, MA www.sylvania.com or Osram Sylvania Ltd, Mississauga, ON (905) 673-6171.
 - g. Philips Lighting Co, Somerset, NJ www.lighting.philips.com/nam or Philips Lighting Canada, Scarborough, ON (416) 292-3000.
 - h. Universal Lighting Technologies, Nashville, TN www.universalballast.com.
 - i. Venture Lighting International, Solon, OH www.venturelighting.com.
 - j. Watt Stopper Inc, Santa Clara, CA www.wattstopper.com.
 - k. Westinghouse Lighting Corp, Philadelphia, PA www.westinghouselightbulbs.com.
 - 2. Product Options: When several lighting fixtures are specified by name for one use on Drawings, select any one of those specified. Do not mix fixtures from different manufacturers specified for one use.
- B. Materials
 - 1. Lighting Fixtures:
 - a. Type One Acceptable Products:
 - 1) See Fixture Schedule on Drawings for acceptable manufacturers and models.
 - 2) Equals as approved by Architect before bidding. See Section 01 6200.
 - 2. Fluorescent Ballasts:
 - a. Energy saving electronic for T8 lamps:
 - 1) Program rapid start type.

- 2) Parallel circuit type.
 - 3) Minimum power factor of 95 percent.
 - 4) Maximum total harmonic distortion of 10 percent.
 - 5) Operation of lamps in compliance with Lamp Manufacturer's recommendations.
 - 6) Minimum starting temperature 0 deg F (minus 17.8 deg C) for T8 lamps.
 - 7) Class A sound rating.
 - 8) Transient protection in accordance with IEEE / ANSI C62.41.1, Category A.
 - 9) Comply with FCC 47 CFR Part 18.
 - 10) Ballast factor of 0.78.
 - 11) Maximum crest factor of 1.7.
 - 12) Five year full replacement warranty including labor allowance for replacement.
 - 13) Input voltage to match system voltage.
 - 14) Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
 - a) IOP2PSP32LWSC by Advance.
 - b) GE32-MVPS-L by General Electric.
 - c) QHE-UNV-PSX-SC by Osram / Sylvania.
- b. Electronic solid state for 265mA, LED:
- 1) UL listed and labeled.
 - 2) Minimum power factor of 90 percent.
 - 3) Maximum total harmonic distortion of 20 percent.
 - 4) Operation of lamps at normal light output and in compliance with Lamp Manufacturer's recommendations.
 - 5) Audible noise level lower than quietest CBM certified ballast for same application.
 - 6) Transient protection in accordance with ANSI 62.41.1.
 - 7) Comply with FCC Rules Part 18, 15J.
 - 8) Maximum crest factor of 1.7.
 - 9) Five year full replacement warranty including labor allowance for replacement.
 - 10) Ballast voltage to match system voltage.
 - 11) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a) Advance.
 - b) Howard Industries.
 - c) Universal Lighting Technologies.
 - d) Osram / Sylvania.
3. Lamps:
- a. T8 Fluorescent Lamps:
- 1) Minimum initial output of 3100 Lumens.
 - 2) Rated life of 24,000 hrs at 3 hrs per start for lamps operated on instant start ballasts.
 - 3) Minimum CRI 85
 - 4) Meet Federal TCLP criteria.
 - 5) Category Four approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a) General Electric.
 - b) North American Philips.
 - c) Osram / Sylvania.
 - d) Westinghouse
- b. Other Lamps:
- 1) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
 - a) General Electric.
 - b) North American Philips.
 - c) Osram / Sylvania.
 - d) Westinghouse
- C. 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.
- 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.
- D. Where recessed fixtures are to be installed, provide openings, plaster rings, etc, of exact dimensions for such fixtures to be properly installed. Coordinate fixture installation with ceiling type and thickness. Terminate circuits for recessed fixtures in an extension outlet box near fixture and connect with specified flexible conduit.

3.2 ADJUSTMENT

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

END OF SECTION

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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. Products Furnished But Not Installed Under This Section:
 - 1. Anchor bolts.
- C. 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 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 to existing photo cell or exterior 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 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

31 3000 EARTHWORK METHODS

31 3116 TERMITE CONTROL

END OF TABLE OF CONTENTS

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SECTION 31 0501**COMMON EARTHWORK REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited to:
 - 1. General procedures and requirements for earthwork.
- B. Related Requirements:
 - 1. Pre-Installation conferences held jointly with Section 31 0501 as described in Administrative Requirements on Part 1 of this specification section:

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 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 3053: 'Miscellaneous Exterior Cast-In-Place 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 common earthwork schedule.
 - 2) Review protection requirements.
 - 3) Review cleaning requirements.
 - 4) Review safety issues.
 - 5) 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 landscape finish grade tolerance requirements.
 - 2) Review additional agenda items as specified in related sections listed above.
- B. General Earthwork Sequencing:
1. Excavation.
 2. Rough Grading.
 3. Compacted Fill.
 4. Fine Grading.
 5. Aggregate Base or Topsoil Grading.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
1. Forty eight (48) hours minimum before performing any work on site, contact Blue Stakes 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 FIELD QUALITY CONTROL

A. Field Tests:

1. 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.

B. Field Inspections:

1. Notify Architect forty eight (48) hours before performing excavation or fill work.
2. If weather, scheduling, or any other circumstance has interrupted work, notify Architect twenty four (24) hours minimum before intended resumption of grading or compacting.

C. 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

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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 slabs-on-grade concrete.
 - 2) Miscellaneous cast-in-place concrete and equipment pads.
- B. Products Installed But Not Furnished Under This Section:
- C. Related Requirements:
 - 1. Section 01 0000: 'General Requirements':
 - a. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
 - b. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - c. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - d. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - e. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - f. Section 01 7800: 'Closeout Submittals'.
 - 2. Section 31 0501: 'Common Earthwork Requirements':
 - a. General procedures and requirements for earthwork.
 - b. Pre-installation conference held jointly with other common earthwork related sections.
 - 3. Section 31 2213: 'Rough Grading'.
 - 4. Section 31 2216: Subgrade procedures.
 - 5. Section 31 2323: Compaction procedures and tolerances.
 - 6. Section 31 3116: Termite control".

1.2 REFERENCES

- A. Association Publications:
 - 1. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15th St., NW, Washington, DC 20005; 202-347-7474; www.acec.org).
- B. Definitions:
 - 1. AASHTO: The American Association of State Highway and Transportation Officials. Organization of highway engineers from the 50 states that develops guides and standards.
- C. Definitions (Following are specifically referenced for testing):
 - 1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
 - 2. Approved: To authorize, endorse, validate, confirm, or agree to.
 - 3. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.

4. Inspection/Special Inspection: Inspection of materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards:
 - a. Inspection: Not required by code provisions but may be required by Contract Documents.
 - b. Special Inspection: Required by code provisions and by Contract Documents.
 - c. Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
 - d. Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.
 5. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform particular construction operation, including installation, erection, application, and similar operations.
 6. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation. They are not samples. Approved mockups establish standard by which the Work will be judged.
 7. Owner's Representative: Owner's Designated Representative (Project Manager or Facilities Manager) who will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.
 8. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
 9. Product Testing: Tests and inspections that are performed by testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards..
 10. Relative Compaction: Ratio of field dry density as determined by ASTM D6938 or ASTM D2216, and laboratory maximum dry density as determined by ASTM D1557.
 11. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
 12. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
 13. Service Provider: Agency or firm qualified to perform required tests and inspections.
 14. Source Quality Control Testing: Tests and inspections that are performed at source, i.e., plant, mill, factory, or shop.
 15. Special Inspection: See Inspection.
 16. Special Inspector: Certified individual or firm that implements special inspection program for project.
 17. Special Test: See Test.
 18. Test/Special Test: Field or laboratory tests to determine characteristics and quality of building materials and workmanship.
 - a. Test: Not required by code provisions but may be required by Contract Documents.
 - b. Special Test: Required by code provisions and by Contract Documents.
 19. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
 20. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
 21. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.
- D. Reference Standards:
1. ASTM International:
 - a. ASTM C29/C29M-09, 'Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate'.
 - b. ASTM C117-13, 'Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing'.
 - c. ASTM C131-06, 'Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine'.
 - d. ASTM C136-06, 'Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates'.

- e. ASTM C1077-13b, 'Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation'.
 - f. ASTM D698-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³))'.
 - g. ASTM D1556-07, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method'.
 - h. 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))'.
 - i. ASTM D2216-10, 'Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass'.
 - j. ASTM D2419-09, 'Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate'.
 - k. ASTM D2487-11, 'Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)'.
 - l. ASTM D3666-13, 'Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials'.
 - m. ASTM D3740-12a, 'Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction'.
 - n. ASTM D6938-10, 'Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)'.
 - o. ASTM E11-13, 'Standard Specification for Wire Cloth and Sieves for Testing Purposes'.
 - p. ASTM E329-13b, 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
 - q. ASTM E543-13, 'Standard Specification for Agencies Performing Nondestructive Testing'.
 - r. ASTM E1212-12, 'Standard Practice for Quality Management Systems for Nondestructive Testing Agencies'.
2. International Building Code (IBC):
 - a. Chapter 17, 'Structural Tests and Special Inspections' (2012 or latest edition available).

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:

1. Participate in pre-installation conference as specified in Section 31 0501.
2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
 - a. Review termite control application requirements.
 - 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. Termite Control:
 - a. Termite application as described in Section 31 3116 'Termite Control':
 - 1) Application OPTION A:
 - a) Apply termite protection on top of soil base before aggregate base and vapor retarder is installed.
 - 2) Application OPTION B:
 - a) Install vapor retarder after application of termite protection on top of aggregate base.
3. Exterior Footings and Foundations are installed.
4. Aggregate Base:
 - a. Install aggregate base at location shown in Contract Drawings.
5. Concrete Slab is installed.

C. Scheduling:

1. Interior slab-on-grade concrete:

- a. Notify Architect twenty four (24) hours minimum before installation of concrete to allow inspection of vapor retarder installation.
 - b. Notify Testing Agency and Architect twenty four (24) hours minimum before installation of interior concrete slabs to allow inspection of aggregate base.
 - c. Allow 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. 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. Interior slab-on-grade 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 - 5 |
2. Miscellaneous exterior concrete (Section 03 3053):
 - 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.
- C. Surface Preparation (Interior Slab-On-Grade Concrete):
 1. Vapor retarder:
 - a. Install vapor retarder in accordance with ASTM E1643 except where Contract Documents indicate otherwise and following instructions:
 - 1) Install vapor retarder over aggregate base over compacted subgrade so entire area under slab is covered.
 - 2) Install vapor retarder in accordance with ASTM E1643 at interior stem walls.
 - 3) Lap joints **6 inches (150 mm)** minimum and seal with specified seam tape.
 - 4) Seal vapor retarder around pipes, conduits, and other utility items that penetrate vapor retarder using factory-fabricated boot installed as recommended by Manufacturer.
 - 5) Except for punctures required for reinforcing and anchor bolts at top of stem walls, seal tears and punctures.

3.2 INSTALLATION

- A. Aggregate Base:
 1. General:
 - a. Do not place aggregate base material when subgrade is frozen or unstable.
 - b. Spread aggregate base material with equipment except in limited or restricted areas where use of hand spreading is allowed.
 - c. Spread aggregate base material in manner that does not break down material and eliminates segregation, ruts, and ridges.
 - d. Correct damage to aggregate base caused by construction activities, and maintain corrected aggregate base until subsequent course is placed.
 - e. Do not allow traffic on aggregate base.
 - f. Remove all standing storm water.
 2. Interior concrete slab-on-grade aggregate base (Contractor Option):

- a. Place **4 inches (100 mm)** minimum of aggregate base under vapor retarder, level, and compact with two passes of **2 1/2 ton (2.54 metric ton)** minimum roller.
 - b. Place **4 inches (100 mm)** minimum of aggregate base under vapor retarder, level, and compact with vibratory plate compactor.
3. 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. 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, 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, 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.

3.4 PROTECTION

A. Interior Slab-On-Grade Concrete:

1. Do not allow water onto aggregate base before placing concrete.

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 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 0000: 'General Requirements':
 - a. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
 - b. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - c. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - d. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - e. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - f. Section 01 7800: 'Closeout Submittals'.
2. Section 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.
 - c. Pre-installation conference held jointly with other common planting related sections.
3. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
4. Section 31 2213: 'Rough Grading' for grading and preparation of natural soil subgrades below fill and aggregate base materials.
5. Section 31 2316: 'Excavation'.
6. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.

1.2 REFERENCES

A. Association Publications:

1. American Concrete Institute, Farmington Hills, MI www.concrete.org. Abstracts of ACI Periodicals and Publications.
 - a. ACI 229R-13, '*Report on Controlled Low-Strength Materials*'.
2. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15th St., NW, Washington, DC 20005; 202-347-7474; www.acec.org).

B. Definitions (Following are specifically referenced for testing):

1. AASHTO: The American Association of State Highway and Transportation Officials. Organization of highway engineers from the 50 states that develops guides and standards.
2. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
3. Approved: To authorize, endorse, validate, confirm, or agree to.
4. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.
5. Inspection/Special Inspection: Inspection of materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards:

- a. Inspection: Not required by code provisions but may be required by Contract Documents.
 - b. Special Inspection: Required by code provisions and by Contract Documents.
 - c. Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
 - d. Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.
6. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform particular construction operation, including installation, erection, application, and similar operations.
 7. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
 8. Owner's Representative: Owner's Designated Representative (Project Manager or Facilities Manager) who will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.
 9. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
 10. Product Testing: Tests and inspections that are performed by testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
 11. Relative Compaction: Ratio of field dry density as determined by ASTM D6938 or ASTM D2216, and laboratory maximum dry density as determined by ASTM D1557.
 12. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
 13. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
 14. Service Provider: Agency or firm qualified to perform required tests and inspections.
 15. Source Quality Control Testing: Tests and inspections that are performed at source, i.e., plant, mill, factory, or shop.
 16. Special Inspection: See Inspection.
 17. Special Inspector: Certified individual or firm that implements special inspection program for project.
 18. Special Test: See Test.
 19. Test/Special Test: Field or laboratory tests to determine characteristics and quality of building materials and workmanship.
 - a. Test: Not required by code provisions but may be required by Contract Documents.
 - b. Special Test: Required by code provisions and by Contract Documents.
 20. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
 21. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
 22. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.
- C. Reference Standards:
1. ASTM International (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 D1556-07, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method'.
 - c. ASTM D1557-09, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))'.
 - d. ASTM D2167-08, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method'.
 - e. ASTM D2216-10, 'Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass'.
 - f. ASTM D2487-11, 'Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)'.

- g. ASTM D3666-11, 'Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials'.
 - h. ASTM D3740-12a, 'Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction'.
 - i. ASTM D6938-10, 'Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)'.
 - j. ASTM E329-11c: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
 - k. ASTM E543-09, 'Standard Specification for Agencies Performing Nondestructive Testing'.
 - l. ASTM E1212-09, 'Standard Practice for Quality Management Systems for Nondestructive Testing Agencies'.
2. International Building Code (IBC):
 - a. Chapter 17, 'Structural Tests and Special Inspections' (2012 or latest edition available).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 1. Participate in 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 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.

1.4 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 will provide Testing and Inspection for fill / engineering fill:
 - a. 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. Landscaping and Planting Tolerances:
 - a. Maximum variation from required grades shall be **1/10 of one foot (28 mm)**.
 - b. To allow for final finish grades as specified in Section 32 9121 of planting areas, fine grade elevations before placing topsoil and mulch are:
 - 1) Sod Areas: **7 inches (175 mm)** below top of walk or curb.
 - 2) Seeded Areas: **6 inches (150 mm)** below top of walk or curb.
 - 3) Ground Cover Areas: **7 inches (180 mm)** below top of walk or curb.
 - 4) Tree And Shrub Areas: **4 inches (100 mm)** below top of walk or curb.
 - 3. Slope grade away from building as specified in Section 32 9120.

3.3 FIELD QUALITY CONTROL

- A. Field Tests and Inspections:
 - 1. 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 moisture-maximum density relationship test for each type of fill material.
 - 2. Site preparation:

- a. Prior to placement of 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.

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 1123: 'Aggregate Base'.
 - 3. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
 - 4. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
 - 5. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.
 - 6. Performance of excavating inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in pre-installation conference as specified in Section 31 0501:
 - 2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
 - a. Review protection of existing utilities requirements.

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

- A. Verification Of Conditions:
 - 1. Carefully examine site and available information to determine type soil to be encountered.
 - 2. Discuss problems with Architect before proceeding with work.

3.2 PREPARATION

- A. Protection of Existing Utilities:
 - 1. Protect existing utilities identified in Contract Documents during excavation.
 - 2. If 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. Bottom of excavations to receive footings shall be undisturbed soil.
 - b. Excavation Carried Deeper Than Required:
 - 1) Under Footings: Fill with concrete specified for footings.
 - 2) Under Slabs: Use specified compacted backfill material.
 2. Pavement And Miscellaneous Cast-In-Place Concrete:
 - a. Excavate as necessary for proper placement and forming of concrete site elements and pavement structure. Remove vegetation and deleterious material and remove from site.
 - b. Backfill over-excavated areas with compacted base material specified in Section 31 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 0000: 'General Requirements':
 - a. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
 - b. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - c. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
 - d. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
 - e. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - f. Section 01 7800: 'Closeout Submittals'.
 2. Section 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.
 3. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
 4. Section 31 2213: 'Rough Grading' for 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 2316: 'Excavation'.
 7. 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. Association Publications:
1. American Concrete Institute, Farmington Hills, MI www.concrete.org. Abstracts of ACI Periodicals and Publications.
 - a. ACI 229R-99, *Controlled Low-Strength Materials* (Reapproved 2005).
 2. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15th St., NW, Washington, DC 20005; 202-347-7474; www.acec.org).
- B. Definitions (Following are specifically referenced for testing):
1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
 2. Approved: To authorize, endorse, validate, confirm, or agree to.
 3. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.

4. Inspection/Special Inspection: Inspection of materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards:
 - a. Inspection: Not required by code provisions but may be required by Contract Documents.
 - b. Special Inspection: Required by code provisions and by Contract Documents.
 - c. Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
 - d. Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.
 5. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform particular construction operation, including installation, erection, application, and similar operations.
 6. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
 7. Owner's Representative: Owner's Designated Representative (Project Manager or Facilities Manager) who will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.
 8. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
 9. Product Testing: Tests and inspections that are performed by testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
 10. Relative Compaction: Ratio of field dry density as determined by ASTM D6938 or ASTM D2216, and laboratory maximum dry density as determined by ASTM D698 or ASTM D1557.
 11. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
 12. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
 13. Service Provider: Agency or firm qualified to perform required tests and inspections.
 14. Source Quality Control Testing: Tests and inspections that are performed at source, i.e., plant, mill, factory, or shop.
 15. Special Inspection: See Inspection.
 16. Special Inspector: Certified individual or firm that implements special inspection program for project.
 17. Special Test: See Test.
 18. Test/Special Test: Field or laboratory tests to determine characteristics and quality of building materials and workmanship.
 - a. Test: Not required by code provisions but may be required by Contract Documents.
 - b. Special Test: Required by code provisions and by Contract Documents.
 19. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
 20. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
 21. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.
- C. Reference Standards:
1. ASTM International (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 D1556-07, '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 D2167-08, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method'.

- e. ASTM D2216-10, 'Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass'.
 - f. ASTM D2487-11, 'Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)'.
 - g. ASTM D3666-13, 'Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials'.
 - h. ASTM D3740-12a, 'Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction'.
 - i. ASTM D6938-10, 'Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)'.
 - j. ASTM E329-14: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
 - k. ASTM E543-13, 'Standard Specification for Agencies Performing Nondestructive Testing'.
 - l. ASTM E1212-12, 'Standard Practice for Quality Management Systems for Nondestructive Testing Agencies'.
2. International Code Council (IBC):
 - a. Chapter 17, 'Structural Tests and Special Inspections' (2012 or latest edition available).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 1. Participate in pre-installation conference as specified in Section 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 Geotechnical Evaluation 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 frequency of testing and inspections.
- B. Sequencing:
 1. Do not backfill against bituminous dampproofing for twenty four (24) hours after application of dampproofing.
 2. Before backfilling, show utility and service lines being covered on record set of Drawings. Do not backfill until utilities involved have been tested and approved by Architect and until instructed by Architect.
- C. Scheduling:
 1. Notify Testing Agency and Architect seventy two (72) hours minimum before installation of fill / engineered fill to perform proctor and plasticity index tests on proposed fill or subgrade.
 2. Notify Testing Agency and Architect 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 will provide Testing and Inspection for fill / engineering fill:
 - a. See Section 01 1200: 'Multiple Contract Summary'.

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.
 - 2.

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 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.
 - 4. 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.
 - 2) Under Pavement and Concrete Site Elements: Extend excavatable flowable fill / backfill to elevation of subgrade. Do not place aggregate base material until excavatable flowable fill / backfill has cured seventy two (72) hours.
 - 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 Driveways And Parking Areas:
 - 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) 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.
 - 5) 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.
 - 6) Fill Slopes: Compact by rolling or using sheepsfoot roller.
 - 7) Backfill Under Footings: Not allowed.
 - 8) Landscape Areas:
 - a) Compact fill to eighty five (85) percent minimum relative compaction.
 - 9) Other Backfills: Place other fills in **12 inch (300 mm)** layers and compact to ninety five (95) percent relative compaction.
 - 10) 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. 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, 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 2009 IBC Table 1704.7. 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

SECTION 31 3116**TERMITE CONTROL****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install complete soils treatment with termiticide under and adjacent to building to provide uniform toxic barrier continuous treated zone in all routes of termite entry.
- B. Related Requirements:
 - 1. Section 31: Earthwork.
 - a. Section 31 0501: 'Common Earthwork Requirements'.
 - b. Section 31 1123: 'Aggregate Base':
 - 1) Installation of below-grade vapor retarder.
 - c. Section 31 2216: 'Fine Grading'.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate soil treatment application with excavation, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.
 - 2. Interior slab-on-grade concrete:
 - a. Coordinate work so vapor retarder can be installed as soon as possible after application of termite protection on top of soil base or aggregate base.
- B. Pre-Installation Conference:
 - 1. Participate in mandatory pre-installation conference.
 - 2. Schedule pre-installation conference for new Projects after completion of Fine Grading specified in Section 31 2216, but before beginning Aggregate Base as specified in Section 31 1123. This conference may be held jointly with pre-installation conference for Common Planting Requirements specified in Section 32 9001.
 - 3. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review Applicator Qualification requirements.
 - b. Review Ambient Conditions for acceptability for application of termiticide products.
 - c. Review Delivery, Storage, and Handling requirements.
 - d. Review Examination, Preparation, and Application requirements as called out in Part 3 Execution.
 - e. Review Field Quality Control and Protection requirements as called out in Part 3 Execution.
- C. Sequencing:
 - 1. Application OPTION A:
 - a. Apply termite protection on top of soil base before aggregate base and vapor retarder is installed.
 - 2. Application OPTION B:
 - a. Install vapor retarder after application of termite protection on top of aggregate base.
 - b. Increase application rate for volume as per Manufacturer's instruction.
 - c. Install below-grade vapor retarder on top of soil base or aggregate base.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:

- a. Submit Chemical Manufacturer's printed literature regarding chemical composition, concentration, and rates and method of application.
 - b. Submit MSDS information.
- B. Informational Submittals:
1. Certificates:
 - a. Provide certificates required by any authorities having jurisdiction (AHJ).
 2. Design Data Submittals:
 - a. Certified Applicator's statement indicating total amount of chemical required for Project to provide required amount of mix solution at specified concentration and application rates.
 - b. Certified Applicator to submit take-off showing amounts of square foot and lineal foot application at specified application rate. Also indicate total amount of mix solution required for Project.
 3. Manufacturers' Instructions:
 - a. Manufacturer's printed label on product regarding chemical composition, concentration, and rates and method of application.
 4. Qualification Submittals:
 - a. Provide BASF Partner Number and evidence of license from authorities having jurisdiction (AHJ).
- C. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation:
 - 1) Include copy of final, executed warranty.
 - b. Record Documentation:
 - 1) Soil Treatment Application Report: After application of termiticide is complete, submit report including the following:
 - a) Date and time of application.
 - b) Moisture content of soil before application.
 - c) Termiticide brand name and batch number of concentrate.
 - d) Mix rate and quantity of diluted termiticide used.
 - e) Areas of application.
 - f) Weather at time of application.
 - g) Water source for application.

1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
1. Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.
- B. Qualifications:
1. Applicator: Requirements of Section 01 4301 applies but not limited to the following:
 - a. Applicator shall be licensed pest professional according to regulations of authorities having jurisdiction (AHJ) with Manufacturer's Certification training in correct application methods to apply termite control treatment and products in jurisdiction where Project is located.
 - b. Applicator should be familiar with trenching, rodding, short rodding, subslab injection, low-pressure banded surface applications, and foam delivery techniques.
- C. Source Limitations:
1. Obtain termite control products from single source from single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery, Storage, and Handling:
1. Certified Applicator responsible for delivery, storage, handling, and dispose of specified products of this section.

B. Storage And Handling Requirements:

1. Storage:
 - a. Keep containers closed when not in use.
 - b. Store unused product in original container only, out of reach of children and animals.
 - c. Do not store near food or feed.
 - d. Protect from freezing.
2. Spills or leaks:
 - a. General:
 - 1) In case of spill or leak on floor or paved surfaces, soak up with sand, earth, or synthetic absorbent.
 - 2) Avoid skin contact.
 - 3) Remove residue to chemical waste area.
 - 4) Ensure adequate decontamination of tools and equipment following cleanup.
 - b. All leaks resulting in application of this product in locations other than those prescribed must be cleaned up prior to leaving application site.
 - 1) DO NOT allow people or pets to contact contaminated areas until cleanup is completed.

C. Packaging Waste Management:

1. Disposal:
 - a. Dispose of empty containers in accordance with Manufacturer's and regulatory agency's requirements.
 - b. Do not contaminate water, food, or feed by storage or disposal.

1.6 FIELD CONDITIONS**A. Ambient Conditions**

1. Comply with EPA-Registered Label and requirements of authorities having jurisdiction (AHJ) and Manufacturer's written recommendations regarding environmental conditions under which termiticide shall be applied.

B. Environmental Limitations:

1. To ensure penetration, do not treat soil that is water saturated or frozen.
2. Do not treat soil (or aggregate base) while precipitation is occurring or movement from treatment area (site) is likely to occur.
3. Do not treat soil (or aggregate base) while large precipitation is expected to occurring within two to four (2-4) hours after application.

1.7 WARRANTY**A. Manufacturer Warranty:**

1. Provide Manufacturer's written warranty:
 - a. Warranty shall guarantee effectiveness of treatment against subterranean termite infestation for five (5) years minimum from acceptance date of Project and be signed by applicator and Contractor as co-guarantors.
 - b. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

PART 2 - PRODUCTS**2.1 MATERIALS****A. Termiticide:**

1. Description:
 - a. Provide EPA-Registered termiticide, complying with requirements of authorities having jurisdiction (AHJ), in aqueous solution formulated to prevent termite infestation.

- b. Provide quantity required for application at label volume and rate for maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.
2. Design Criteria:
 - a. Undetectable:
 - 1) Non-repellent or undetectable chemical technology.
 - b. Transfer Effect:
 - 1) Slow-acting treatment allowing individual termite's ample time to transfer treatment to other termites as they come in contact within the colony.
 - c. Service Life of Treatment:
 - 1) Soil treatment termiticide that is effective for not less than five (5) years against infestation of subterranean termites.
3. Mixes:
 - a. Mix chemicals and water at Manufacturer's recommended printed requirements.
 - 1) To provide maximum control and protection against termite infestation, apply as per Manufacturer printed instructions including but not limited to the following:
 - a) To maximize termiticide potency, product should be applied in manner to provide continuous treated zone to prevent termites from infesting wood to be protected.
 - b) Product is labeled for use at 0.06 percent, 0.09 percent or 0.125 percent finished dilution. The 0.06 percent finished dilution should be used for typical control situations. Where severe termite infestations, problem soils, or difficult construction types are encountered, it may be advisable to use either 0.09 percent or 0.125 percent.
4. Category Four Approved Product. See Section 01 6200 for definitions of Categories. (No substitution of specified product or alteration of Manufacturer's application requirements is allowed):
 - a. Termidor by BASF Professional Pest Control, Research Triangle Park, NC
www.termidorhome.com, or www.pestcontrol.basf.us.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Evaluation And Assessment:
 1. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.
 2. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protection Of In-Place Conditions:
 1. Allow no disturbance of treated soil (aggregate base) between application of solution and placing of concrete. (Disturbed defined as removing fill and/or replacing fill).
 2. Protect neighboring property, water sources, and personnel on site from contamination.
 - a. Use anti-backflow equipment or procedures.
 - b. Do not treat soil beneath structures that contain wells or cisterns.
 - c. Take extreme care to avoid runoff. Do not treat soil that is water-saturated or frozen.
 3. Maintain, on job site, empirical name of chemical, Manufacturer's precautions, and phone numbers of proper authorities to notify in case of spillage or other accident.
- B. General Preparation:
 1. Comply with the most stringent requirements of authorities having jurisdiction (AHJ) and with Manufacturer's written instructions for preparation before beginning application of termite control treatment.

2. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, trash, and construction waste wood from soil within and around foundations.
 3. Do not apply application of termite control until location of air ducts, vents, water, and sewer lines are known and identified. Take extreme caution to avoid contamination of these structural elements and airways.
- C. Soil Treatment Preparation:
1. Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated.
 2. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings.
 3. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
 4. Fit filling hose connected to water source at site with backflow preventer, complying with requirements of authorities having jurisdiction (AHJ).

3.3 APPLICATION

- A. Interface With Other Work:
1. Interior slab-on-grade concrete:
 - a. Installation of vapor retarder, geomembrane if used, and aggregate base.
- B. General:
1. Comply with the most stringent requirements of authorities having jurisdiction (AHJ) and with Manufacturer's EPA-Registered Label for products.
 - a. Application Restrictions:
 - 1) Do not apply while precipitation is occurring or large precipitation is expected to occurring within two to four (2-4) hours after application'.
 - 2) Do not contaminate water, food or feed. Cover or remove all exposed food, feed and drinking water.
 - 3) Do not apply with **15 feet (4.50 m)** of bodies of fresh water lakes, reservoirs, rivers, permanent streams, marshes, and natural ponds.
 - 4) Do not allow residents, children, other persons or pets into immediate area during application.
 - 5) Do not allow residents, children, other persons or pets into treated area until sprays have dried. After application, applicator is required to check for leaks resulting in deposition of treatment dilution in locations other than those prescribed.
 2. Application OPTION B as specified in Sequencing of this specification in Part 1 General:
 - a. Increase application rate for volume as per Manufacturer's instruction.
- C. Applying Soil Treatment:
1. Mix treatment termiticide solution to a uniform consistency.
 2. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
 3. If impervious soils make reduction in volume of solution necessary, increase percentage of toxicant used in proportion to insure same amount of insecticide be used per linear or square **foot (meter)**.
 4. Apply overall treatment to entire surface to be covered by concrete slab.
- D. Pre-Construction Treatment:
1. For Slab-on-Grade Construction:
 - a. **4 gallons per 10 linear ft (15 liters per 3 000 linear mm)** along outside of exterior foundation.
 - b. **2 gallons per 10 linear ft (7.5 liters per 3 000 linear mm)** in voids of unit masonry foundation walls or piers.

- c. **One gallon per 10 sq ft (3.5 liters per one sq m)** as overall treatment under slab and attached porches.
- d. **4 gallons per 10 linear ft (15 liters per 3 000 linear mm)** along inside of exterior foundation walls, both sides of interior partition foundation walls, and around utility services and other features that will penetrate slab or where there will be break in concrete (grade changes, zip strips, cold joints, etc.).

3.4 RE-APPLICATION

- A. Reapply treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.5 FIELD QUALITY CONTROL

- A. Non-Conforming Work. Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
 1. Applicator:
 - a. Substitution of specified product or alteration of Manufacturer's application requirements is considered defective or not complying with Contract Document requirements. Correct such work at no cost to the Owner.

3.6 PROTECTION

- A. Allow sufficient time (12 hours minimum) for drying after application before resuming construction activities.
- B. Keep off treated areas until completely dry. Do not allow workers or other personnel to enter treatment area until chemical has been absorbed into soil.
- C. Protect application areas from precipitation as recommended by Manufacturer.
- D. Protect temiticide solution, dispersed in treated soils and fill, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- E. Post signs in areas of application warning of poison application. Remove signs when areas with application are covered by other construction.

END OF SECTION

DIVISION 32: EXTERIOR IMPROVEMENTS

32 1000 BASES, BALLASTS, AND PAVING

32 1723 PAVEMENT MARKINGS

32 3000 SITE IMPROVEMENTS

32 3113 CHAIN LINK FENCES AND GATES

END OF TABLE OF CONTENTS

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SECTION 32 1723**PAVEMENT MARKINGS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish material and apply pavement and curb markings as described in Contract Documents.

1.2 REFERENCES

- A. Definitions:
1. Reflectorization: Material, treatment or process to enable incident light to be returned in high proportions in the general direction of the light source.
- B. Reference Standards:
1. U.S. Department of Transportation Federal Highway Administration:
 - a. Manual on Uniform Traffic Control Devices (MUTCD).

1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
1. Paint handicap spaces to conform to ADA Standards and local code requirements.

1.4 FIELD CONDITIONS

- A. Ambient Conditions:
1. Apply only on dry surfaces, during favorable weather, and when damage by rain, fog, or condensation not anticipated.
 2. Latex Paint:
 - a. Atmospheric temperature above 50 deg F (10 deg C).
 - b. When temperature is not anticipated to drop below 50 deg F (10 deg C) during drying period.

PART 2 - PRODUCTS**2.1 MATERIAL**

- A. Paint:
1. Non-Reflectorized.
 2. Types:
 - a. Water based latex or acetone based paint.
 3. Colors:
 - a. White (Yellow may be used at Owner Representative's discretion):
 - 1) Lane lines, edge lines, transverse lines, arrows, words, symbol markings, speed bump markings, parking space markings.
 - b. Yellow:
 - 1) Cross-hatching in medians, cross hatching in safety zones separating opposing traffic flows, crosswalk stripes, safety markings, centerlines, edge lines along the left edge of a one-way roadway or one way ramp.
 - c. Blue And White:

- 1) In parking spaces specifically designated as reserved for the disabled.
- d. Red:
 - 1) Fire lanes, no parking zones, special raised pavement markers that are placed to be visible to "wrong-way" drivers.
4. Type Two Acceptable Products:
 - a. Traffic Marking Paint by Sherwin-Williams, Cleveland, OH www.sherwin-williams.com.
 - b. Equal as approved by Architect before application. See Section 01 6200.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Do not apply acrylic latex system until paving has cured seven (7) days minimum. Other paint systems may be applied as per Manufacturer's recommendations.
- B. Surfaces shall be dry and free of grease and loose dirt particles. Scrape and wire brush chipped or damaged paint on existing curbs.
- C. Perform layout with chalk or lumber crayon only.

3.2 APPLICATION

- A. Tolerances:
 1. General: Make lines parallel, evenly spaced, and with sharply defined edges.
 2. Line Widths:
 - a. Plus or minus **1/4 inch (6 mm)** variance on straight segments.
 - b. Plus or minus **1/2 inch (13 mm)** variance on curved alignments.
- B. Coverage:
 1. Apply a single coat to parking lots which are being re-stripped and where no surface treatments are being applied.
 2. Apply a single coat to an emulsion seal coat.
 3. Apply two (2) coats to a slurry seal coat. Apply a single coat and then wait thirty (30) to forty five (45) days and after ravel sweeping to apply the second coat.
 4. Apply two (2) coats to new parking lots and new overlays.
 5. Apply each coat at **150 sq ft (14 sq m)** per gal.
 6. Apply second coat after three (3) hours minimum or when first coat is thoroughly dried, whichever is longer.

3.3 CLEANING

- A. Remove drips, overspray, improper markings, and paint material tracked by traffic by sand blasting, wire brushing, or other method approved by Architect before performance.

END OF SECTION

SECTION 32 3113**CHAIN LINK FENCES AND GATES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install complete fence and gates as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 03 3053: Mow strips at fencing.
 - 2. Section 05 0503: 'Shop-Applied Metal Coatings' for priming and galvanizing repair.
 - 3. Section 05 0523: 'Metal Fastening' for welding requirements.

1.2 REFERENCES

- A. Association Publications: / Organizations:
 - 1. Chain Link Fence Manufacturers Institute (CLFMI), Columbia, MD www.chainlinkinfo.org.
 - a. WLG 2445, '*Chain Link Fence Wind Load Guide for the Selection of Line Post and Line Post Spacing*' (2012).
 - b. CLF-SFR0111, '*Chain Link Fence Manufacturers Institute Security Fencing Recommendations*'.
 - c. CLF-PM0610, '*Field Inspection Guide*'.
 - d. CLF-TP0211, '*Tested and Proven Performance of Security Grade Chain Link Fencing Systems*'.
- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM A123/A123M-12, 'Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products'.
 - b. ASTM A153/A153M-09, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
 - c. ASTM A392-11a, 'Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric'.
 - d. ASTM A1011/A1011M-12b, 'Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength'.
 - e. ASTM C1107/C1107M-13, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)'.
 - f. ASTM F1043-12, 'Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework'.
 - g. ASTM F1083-10, 'Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures'.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: Manufacturer literature or cut sheets on fence components.
- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation.

PART 2 - PRODUCTS**2.1 ASSEMBLIES****A. Materials:**

1. Fabric:
 - a. Chain link fabric of 9 ga (3.7 mm) wire, galvanized before or after weaving with 1.2 ounce (34 grams) zinc coating conforming to requirements of ASTM A392, Class I.
 - b. Knuckle both selvages.
2. Framework:
 - a. Posts and rails shall be roll-formed, self-draining shapes meeting strength requirements of ASTM F1043, Table 3, and with 2 ounce (56.7 grams) zinc coating per 1 sq ft (0.0929 sq meter) of surface area conforming to ASTM A123/A123M.
 - b. Line Posts:
 - 1) Line Posts 8 feet (2.45 m) and under:
 - a) 1.875 by 1.625 inch (48 by 41 mm) C-section roll formed from steel conforming to ASTM A1011/A1011M, Grade 45, with minimum theoretical bending strength of 247 lbs (112 kg) under 6 foot (1.80 m) cantilever load.
 - b) 2.375 inch (60 mm) outside diameter Schedule 40 tubular section weighing 3.65 lbs (1.6 kg) per lineal 1 ft (305 mm) meeting requirements of ASTM F1083.
 - c) 2.375 inch (60 mm) outside diameter Schedule 40 tubular section weighing 3.12 lbs (1.42 kg) per lineal 1 ft (305 mm) formed from steel meeting requirements of ASTM A1011/A1011M.
 - c. Terminal And Gate Posts:
 - 1) Terminal posts under 6 feet (1.80 m) wide:
 - a) 3.5 by 3.5 inch (89 by 89 mm) roll formed section with minimum theoretical bending strength of 486 pounds (220.5 kg) under 6 foot (1.80 m) cantilever load.
 - b) 3 inch (76 mm) outside diameter Schedule 40 pipe weighing 5.79 lbs (2.63 kg) per lineal 1 ft (305 mm) meeting requirements of ASTM F1083.
 - c) 3 inch (76 mm) outside diameter Schedule 40 tubular section weighing 4.64 lbs (2.11 kg) per lineal 1 ft (305 mm) formed from steel meeting requirements of ASTM A1011/A1011M.
 - d. Top And Brace Rail:
 - 1) 1.625 by 1.25 inch (41 by 32 mm) roll formed section of 45,000 psi (310 MPa) yield strength channel shaped rail with minimum theoretical bending strength of 247 lbs (112 kg) on 10 foot (3.050 m) midpoint load.
 - 2) 1.660 inch 42 mm outside diameter Schedule 40 pipe weighing 2.27 lbs (1.03 kg) per lineal 1 ft (305 mm) meeting requirements of ASTM F1083.
 - 3) 1.660 inch 42 mm outside diameter Schedule 40 tubular section weighing 1.84 lbs (0.83 kg) per lineal 1 ft (305 mm) formed from steel meeting requirements of ASTM A1011/A1011M.
 - e. Fittings:
 - 1) Pressed steel or malleable iron, hot-dip galvanized conforming to ASTM A153/A153M.
 - 2) Tie wires shall be 12 ga (2.05 mm) minimum galvanized steel or 9 ga (3 mm) minimum aluminum wire.
 - f. Tension Wire: 7 ga (3.66 mm) minimum galvanized spring steel.

B. Mixes:

1. Post Foundation Concrete:
 - a. One cu ft cement, 2 cu ft (0.0566 cu m) sand, 4 cu ft (0.1132 cu m) gravel, and 5 gallons (18.93 liters) minimum to 6 gallons (22.71 liters) maximum water.
 - b. Mix thoroughly before placing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fence shall be installed by mechanics skilled and experienced in erecting fences of this type and in accordance with Contract Documents.
1. When general ground contour is to be followed, make changes of grade in gradual, rolling manner.
 2. Evenly space posts in line of fence a maximum of **10 feet (3.050 meter)** center to center.
- B. Post Foundations:
1. Except atop retaining walls, set posts with concrete post foundations as specified below:
 - a. Line Posts Diameter 8 inches Depth 36 inches.
 - b. Gate, End, And Corner Posts Diameter 12 inches Depth 42 inches.
 - c. At mow strips, set top of post foundation below grade sufficient to allow for placing of mow strip. Measure post foundation depth from top of mow strip.
 - d. Where fences are incorporated into slabs, measure post foundation depth from top of slab. Extend bottom of slab footing sufficient to allow specified amount of concrete around post. At existing slabs, install fence outside perimeter of slab.
 - e. For fences on retaining walls, provide **12 inch** long sleeves to be cast into retaining wall. Set pipe in sleeve and grout space between sleeve and post full.
- C. Fence:
1. After posts have been permanently positioned and concrete cured for one (1) week minimum, install framework, braces, and top rail. Join top rail with **6 inch (150 mm)** minimum couplings at not more than **21 foot (6.40 meter)** centers.
 2. Stretch fabric by attaching one end to terminal post and supplying sufficient tension to other end of stretch so slack is removed.
 - a. Fasten fabric to line posts with tie wires. Pass ties over one strand of fabric and hook under line post flange.
 - b. Place one tie as close to bottom of fabric as is possible with additional ties equally spaced between top and bottom band on approximately equal spacing not to exceed **14 inches (355 mm)** on center.
 - c. Attach fabric to roll formed terminals by weaving fabric into integral lock loops formed in post. Attach fabric to tubular terminals with tension bars and bands.
 - d. Hold fabric approximately **2 inches (50 mm)** above finish grade line.
 - e. On top rail, space tie wires at no more than **24 inches (610 mm)** on center.
 - f. Securely attach fittings and firmly tighten nuts.

3.2 CLEANING

- A. Spread dirt from foundation excavations evenly around surrounding area unless otherwise directed. Leave area free of excess dribbles of concrete, pieces of wire, and other scrap materials.

END OF SECTION

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