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BIDDING REQUIREMENTS

FOR SMALL PROJECTS (U.S.)

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INVITATION TO BID (U.S.)

1. CONTRACTORS INVITED TO BID THE PROJECT:

Dynamic Construction
Gines Construction
Majestic Builders
Stone River Construction

2. PROJECT:

Lakeview 1, 2, 3, 10 Flooring

3. LOCATION:

450 West 1800 South, Orem, UT 84058

4. OWNER:

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

5. CONSULTANT:

McNeil Engineering
8610 Sandy Parkway, Suite 200, Sandy, Utah

6. DESCRIPTION OF PROJECT:

- A. Remove and replace existing hardwood flooring; add subterranean drainage system below slab and through landscaping
- 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 2:00 p.m., 11 June 2019 at 110 E Main Street, American Fork, UT - P.O. Box 268, 84003-0268. Bids will be publicly opened at 2:00 p.m., 11 June 2019 at 110 E Main Street, American Fork, UT - P.O. Box 268, 84003-0268.

10. BIDDING DOCUMENTS:

- A. Bidding Documents may be examined at the following plan room locations:
 - 1) Dodge Data and Analytics
 - 2) Mountainlands Area Plan Room
- B. Bidding Documents are available to invited Contractors with a deposit of \$25.00 per set.

Deposit will be refunded if documents are returned complete and in good condition within five days of bid opening.

11. **BIDDER'S QUALIFICATIONS:** Bidding by the Contractors will be by invitation only.
12. **OWNER'S RIGHT TO REJECT BIDS:** Owner reserves the right to reject any or all bids and to waive any irregularity therein.

END OF DOCUMENT

INSTRUCTIONS TO BIDDERS (U.S.)

1. DOCUMENTS:

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

2. BIDDER'S REPRESENTATIONS:

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

3. BIDDING DOCUMENTS:

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

4. BIDDING PROCEDURES:

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

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

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

5. CONSIDERATION OF BIDS:

- A. Opening Of Bids - See Invitation to Bid.

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

6. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:

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

7. MISCELLANEOUS:

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

- B. Examination Schedule for Existing Building and Site
 - 1) Contact loca representative - Nick Cluff, to visit site outside of pre-bid meeting.

END OF DOCUMENT

INFORMATION AVAILABLE TO BIDDERS (U.S.)

1. GEOTECHNICAL DATA

- A. Geotechnical Report -
 - 1) Owner has secured the services of a geotechnical engineer to aid in design of the Project. Following conditions apply -
 - a) A geotechnical report has been prepared by Rollins, Brown and Gunnell, Inc., referred to as the Geotechnical Engineer.
 - b) A copy of this report will be issued to each invited Contractor.
 - c) This report was obtained solely for use in design by Consultant and is not a part of the Contract Documents. It is not intended that Contractor rely on geotechnical engineer's report.
 - d) Reports are provided for Contractor's information but are not a warranty of subsurface conditions.
 - 2) Prior to bidding, Contractor may make his own subsurface investigations to satisfy himself with site and subsurface conditions.

2. ASBESTOS-CONTAINING MATERIAL (ACM)

- A. The building upon which work is being performed has been examined for asbestos-containing material. The following have been identified as containing asbestos in the areas of the building being worked on as part of this Project:
 - 1) none
- B. Refer to Section _____, Article _____ for requirements to be followed.

END OF DOCUMENT

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BID FORM

FOR GENERAL CONTRACT WORK (U.S.)

PROJECT IDENTIFICATION:

Lakeview 1, 2, 3, 10 Flooring

OWNER:

Corporation of the Presiding Bishop of the Church of Jesus Christ of Latter-day Saints, a Utah corporation sole ("Owner")

CONSULTANT:

McNeil Engineering

BID

1. In submitting this Bid, Bidder represents that:
 - a. If this Bid is accepted, Bidder will enter into an agreement with Owner to perform and furnish the Work described in the Bidding Documents for the Bid Price and within the Time of Substantial Completion indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
 - b. Bidder has carefully examined the Bidding Documents consisting of the Project Manual containing the Bidding Requirements, the Conditions of the Contract, and the Specifications, entitled _____, the Drawings entitled _____ and dated _____, and including sheets numbered _____, and addenda numbers _____.
 - c. Bidder has examined the site of the work, existing conditions, and all other conditions affecting the work on the above-named Project.
 - d. Bidder has carefully correlated the information known to Bidder and information and observations obtained from visits to the site with the Bidding Documents.
 - e. Bidder is familiar with federal, State, and local laws and regulations applicable to Project.
 - f. Bidder guarantees there will be no revisions or withdrawal of bid amount for forty-five (45) days after the bid opening.
2. Bidder hereby proposes to furnish all materials, labor, equipment, tools, transportations, services, licenses, fees, permits, etc., required by said documents to complete the Work described by the Contract Documents for the lump-sum of: _____ Dollars (\$ _____).
3. Bidder agrees to achieve substantial completion of the Work within the number of days indicated in the Invitation to Bid.

RESPECTFULLY SUBMITTED:

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

Date

License No.

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CONSTRUCTION MATERIAL ASBESTOS STATEMENT (U.S.)

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

Building Name: Lakeview 1, 2, 3, 10

Building Plan Type: _____

Building Address: 450 West 1800 South, Orem, Utah 84058

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

Project Number: 514435319010101

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

McNeil Engineering
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

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

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

1. **Property/Project.**

Property/Project Number: _____
Property Address (“Project Site”): _____
Project Type: _____
Project Name (“Project”): _____
Stake Name: _____

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

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

- a. This Agreement;
- b. Supplementary Conditions for Small Project Agreement Between Owner and Contractor (U.S.);
- c. The Specifications (Division 01 and Divisions _____);
- d. Drawings entitled and dated _____;
- e. Addendum No. with date(s) _____;
- 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 (\$_____) (the “Contract Sum”). This Contract Sum includes all labor, materials, equipment, tools, costs, expenses, work and services of Contractor and its subcontractors necessary to perform the Work in accordance with the terms of this Agreement, including without limitation travel, communications, and copying costs.

5. **Payment.**

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

6. **Extras and Change Orders.** Owner may order changes in the Work by altering, adding to, or deducting from the Work. In the event of such a change, the Contract Sum and/or the time of completion will be adjusted to reflect the change by means of a written Change Order signed by Contractor and Owner. Contractor will not

commence work on any change until either: (a) Contractor and Owner have executed a Change Order; or (b) Owner has issued a written order for the change acknowledging that there is a dispute regarding the compensation adjustment relating to the change. If Contractor proceeds with a change in the Work without complying with the preceding sentence, Contractor agrees that it will not be entitled to any additional compensation for such change.

7. **Warranty and Correction of Work.** For all Work, services, labor, materials, products, and equipment provided under the Contract Documents, Contractor provides and extends to Owner all statutory, common law, and standard industry warranties as well as those warranties set forth in Owner's Contract Documents. Unless a longer period is specified by Owner's Contract Documents or otherwise, Contractor, at a minimum and in addition to all other warranties, warrants all Work under the Contract Documents for at least one year. Specifically, and without limitation, Contractor will promptly correct at its own expense:
 - a. any portion of the Work which
 - 1) fails to conform to the requirements of the Contract Documents, or
 - 2) is rejected by the Owner as defective or because it is damaged or rendered unsuitable during installation or resulting from failure to exercise proper protection.
 - b. any defects due to faulty materials, equipment, or workmanship which appear within a period of one year from the date of completion of the Work or within such longer period of time as may be prescribed by law or the terms of any applicable special warranty required by the Contract Documents.
8. **Time of Completion.** Contractor will complete the Work and have it ready for Owner's inspection within _____ (_____) calendar days from Notice to Proceed issued by Owner. Time is of the essence. If Contractor is delayed at any time in the progress of the Work by any act or neglect of Owner, or by changes in the Work, or by strikes, lockouts, unusual delay in transportation, unavoidable casualties, or acts of nature beyond Contractor's control, then the time for completion will be extended by the time that completion of the Work is delayed. However, Contractor expressly waives any damages for any such delays.
9. **Owner Provided Items.** Owner may provide furnishings, equipment, and/or other items for the Project. Contractor will install items furnished by Owner and/or receive, store, and protect such items on site until the date Owner accepts the Project.
10. **Product Requirements.** Contractor will provide products that comply with Contract Documents, are undamaged, and, unless otherwise indicated, are new and unused at time of installation. Contractor will provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and for intended use and effect.
11. **Permits, Surveys, and Taxes.** Contractor will obtain and pay for all permits and licenses, and also pay any applicable taxes. Contractor will also obtain and pay for any surveys it needs to perform the Work.
12. **Independent Contractor Relationship.** Contractor is not an agent or employee of Owner but is an independent contractor.
13. **Comply with Laws.** Contractor will comply, and ensure that all subcontractors comply, with all applicable laws, ordinances, rules, regulations, covenants, and restrictions.
14. **Indemnity and Hold Harmless.**
 - a. Contractor will indemnify and hold harmless Owner and Owner's representatives, employees, agents, architects, and consultants from and against any and all claims, liens, damages, liability, demands, costs, judgments, awards, settlements, causes of action, losses and expenses (collectively "Claims" or "Claim"), including but not limited to attorney fees, consultant fees, expert fees, copy costs, and other expenses, arising out of or resulting from performance of or failure to perform the Work, attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of real or personal property, including loss of use resulting therefrom, except to the extent that such liability arises out of the negligence of Owner, its representatives, agents, and employees. This indemnity includes, without limitation, indemnification of Owner from all losses or injury to Owner's property, except to the extent that such loss or injury arises out of the negligence of Owner, its representatives, agents, and employees. This indemnity applies, without limitation, to include Claims occurring both during performance of the Work and/or subsequent to

completion of the Work. In the event that any Claim is caused in part by a party indemnified hereunder, that party will bear the cost of such Claim to the extent it was the cause thereof. In the event that a claimant asserts a Claim for recovery against any party indemnified hereunder, the party indemnified hereunder may tender the defense of such Claim to Contractor. If Contractor rejects such tender of defense and it is later determined that the negligence of the party indemnified hereunder did not cause all of the Claim, Contractor will reimburse the party indemnified hereunder for all costs and expenses incurred by that party in defending against the Claim. Contractor will not be liable hereunder to indemnify any party for damages resulting from the sole negligence of that party.

- b. In addition to the foregoing, Contractor will be liable to defend Owner in any lawsuit filed by any Subcontractor relating to the Project. Where liens have been filed against Owner's property, Contractor (and/or its bonding company which has issued bonds for the Project) will obtain lien releases and record them in the appropriate county and/or local jurisdiction and provide Owner with a title free and clear from any liens of Subcontractors. In the event that Contractor and/or its bonding company are unable to obtain a lien release, Owner in its absolute discretion may require Contractor to provide a bond around the lien or a bond to discharge the lien, at Contractor's sole expense.
- c. In addition to the foregoing, Contractor will indemnify and hold Owner harmless from any claim of any other contractor resulting from the performance, nonperformance or delay in performance of the Work by Contractor.
- d. The indemnification obligation herein will not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or a Subcontractor under workers compensation acts, disability benefit acts, or other employee benefit acts.

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

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

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

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

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

naming Owner and Architect as additional insureds.

d. Automobile Liability Insurance, with:

- 1) Combined Single Limit each accident in the amount of no less than \$500,000; and
- 2) Coverage applying to "Any Auto" or its equivalent.

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

18. **Resolution of Disputes.** In the event there is any dispute arising under the Contract Documents which cannot be resolved by agreement between the parties, either party may submit the dispute with all documentation upon which it relies to Director of Architecture, Engineering, and Construction, 50 East North Temple, Salt Lake City, Utah 84150, who will convene a dispute resolution conference within thirty (30) days. The dispute resolution conference will constitute settlement negotiations and any settlement proposal made pursuant to the conference will not be admissible as evidence of liability. In the event that the parties do not resolve their dispute pursuant to the dispute resolution conference, either party may commence legal action to resolve the dispute. Any such action must be commenced within six (6) months from the first day of the dispute resolution conference or be time barred. Submission of the dispute to the Director as outlined above is a condition precedent to the right to commence legal action to resolve any dispute. In the event that either party commences legal action to adjudicate any dispute without first submitting the dispute to the Director, the other party will be entitled to obtain an order dismissing the litigation without prejudice and awarding such other party any costs and attorney fees incurred by that party in obtaining the dismissal, including without limitation copy costs, and expert and consultant fees and expenses. Pending final resolution of a dispute hereunder, Contractor will proceed diligently with the performance of its obligations pursuant to this Agreement.
19. **Termination by Contractor.** In the event Owner materially breaches any term of the Contract Documents, Contractor will promptly give Written Notice of the breach to Owner. If Owner fails to cure the breach within ten (10) days of the Written Notice, Contractor may terminate this Agreement by giving Written Notice to Owner and recover from Owner the percentage of the Contract Sum represented by the Work completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation or damages as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.
20. **Termination by Owner for Cause.** Should Contractor fail to timely provide Owner with the certificates of insurance, make a general assignment for the benefit of its creditors, fail to apply enough properly skilled workmen or specified materials to properly prosecute the Work in accordance with Contractor's schedule, or otherwise materially breach any provision of the Contract Documents, then Owner may, without any prejudice to any other right or remedy, give Contractor Written Notice thereof. If Contractor fails to cure its default within ten (10) days, Owner may terminate this Agreement by giving Written Notice to Contractor. In such case, Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor and/or take possession of the premises and all materials, tools, equipment, and appliances thereon, and finish the Work by whatever method Owner deems expedient. Contractor will not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Sum exceeds the expense of finishing the Work, including compensation for additional administrative, architectural, consultant, and legal services (including without limitation attorney fees, expert fees, copy costs, and other expenses), such excess will be paid to Contractor, less any offsets. If such expense exceeds the unpaid

balance, Contractor will pay the difference to Owner. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.

21. **Termination by Owner for Convenience.** Notwithstanding any other provision contained in the Contract Documents, Owner may, without cause and in its absolute discretion, terminate this Agreement at any time. In the event of such termination, Contractor will be entitled to recover from Owner the percentage of the Contract Sum equal to the percentage of the Work which Owner and/or its architect determines has been completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor. Without limitation, Contractor's indemnities and obligations as well as all warranties relative to Work provided through the date of termination survive a termination hereunder.
22. **Enforcement.** In the event either party commences legal action to enforce or rescind any term of this Agreement, the prevailing party will be entitled to recover its attorney fees, costs and legal expenses, including without limitation all copy costs and expert and consultant fees and expenses, incurred in that action and on all appeals, from the other party.
23. **Ownership of Materials, Products, and Intellectual Property Rights.** Owner will retain ownership and intellectual property rights in all plans, designs, drawings, documents, concepts, and materials provided by or on behalf of Owner to Contractor and to all work products of Contractor and its subcontractors for products, services, and Work provided under this Agreement, such products, services, and Work of Contractor and its subcontractors constituting works made for hire. Neither Contractor nor its subcontractors will reuse any portion of such items provided by Owner or work products developed by Contractor or its subcontractors for Owner pursuant to this Agreement or disclose any such items to any third party without the prior written consent of Owner. Owner may withhold its consent in its absolute discretion. Contractor shall obtain the written agreement of each of its subcontractors to the terms of this section prior to permitting the subcontractor to perform any services contemplated by this Agreement.
24. **Comply with Intellectual Property Rights of Others.** Contractor represents and warrants that no Work or services (with its means, methods, goods, and services attendant thereto), provided to Owner will infringe or violate any right of any third party and that Owner may use and exploit such Work, means, methods, goods, and services without liability or obligation to any person or entity (specifically and without limitation, such Work, means, methods, goods, and services will not violate rights under any patent, copyright, trademark, or other intellectual property right or application for the same).
25. **Ownership and Use of Renderings and Photographs.** Renderings, photographs, and/or other images of or representing the services, Work, or any improvement on or relative to the Project Site, whether created before, during, or at completion of construction (and whether created by Owner, Contractor, or Contractor's subcontractors), are the property of the Owner. Contractor hereby transfers and assigns to Owner all ownership and intellectual property rights that Contractor and/or its subcontractors may have in and to all such renderings, photographs, and other images. The Owner reserves all rights including copyrights and other intellectual property rights to such renderings, photographs, and other images. No such renderings, photographs, or other images shall be used or distributed without written consent of the Owner.
26. **Public Statements.** Contractor will not make any statements or provide any information to the media about the Project or Work without the prior written consent of Owner. If Contractor receives any requests for information from media, Contractor will refer such requests to Owner.
27. **Confidentiality.** Contractor shall ensure that Contractor and its subcontractors, and the employees, agents and representatives of Contractor and its subcontractors, maintain in strict confidence, and shall use and

disclose only as authorized by Owner all Confidential Information of Owner that Contractor receives in connection with the performance of this Agreement. Notwithstanding the foregoing, Contractor may use and disclose any information to the extent required by an order of any court or governmental authority, but only after it has notified Owner and Owner has had an opportunity to obtain reasonable protection for such information in connection with such disclosure. For purposes of this Agreement, "Confidential Information" means:

- a. The name or address of any affiliate, customer or contractor of Owner or any information concerning the transactions of any such person with Owner;
- b. Any contracts, agreements, business plans, budgets or other financial information, renderings, photographs, and materials provided by Owner, relating to the Work or any improvement on the Project Site to the extent such has not been made available to the public by the Owner;
- c. Any other information that is marked or noted as confidential at the time of its disclosure.

28. **No Commercial Use of Transaction or Relationship.** Without the prior written consent of Owner, which Owner may grant or withhold in its sole discretion, neither Contractor nor Contractor's affiliates, officers, directors, agents, representatives, shareholders, members, Subcontractors, or employees shall make any private commercial use of their relationship to Owner or the Project, including, without limitation:

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

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

29. **Entire Agreement.** This Agreement contains the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either written or oral, relating to the Project. This Agreement may be amended only by a writing signed by both parties. This Agreement will not be construed to create a contractual relationship of any kind between any persons or entities other than Owner and Contractor.

30. **Assignment.** Contractor will not assign any right or obligation hereunder without the prior written consent of the Owner, which consent may be granted or withheld in Owner's absolute discretion.

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

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

OWNER:

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

CONTRACTOR:

(company)

Signature:

Signature:

Print Name:

Print Name:

Title:

Title:

Address:

Address:

Telephone No:

Telephone No:

Facsimile No:

Facsimile No:

Email:

Email:

Effective Date:

Fed. I.D. or SSN:

License No:

Reviewed By:

Date Signed:

SAMPLE

SUPPLEMENTARY CONDITIONS

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

ITEM 1 - GENERAL

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

ITEM 2 - LIQUIDATED DAMAGES PAYABLE TO OWNER

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

Delay in Completion of the Work. For each day after the expiration of the designated Time of Completion that Contractor has not completed the Work, Contractor will pay Owner the amount of three-hundred and fifty dollars (\$350.00) per day as liquidated damages for Owner's loss of use and the added administrative expense to Owner to administer the Project during the period of delay. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorneys' fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay. Owner may deduct any liquidated damages or reimbursable expenses from any money due or to become due to Contractor. If the amount of liquidated damages and reimbursable expenses exceeds any amounts due to Contractor, Contractor will pay the difference to Owner within ten (10) days after receipt of a written request from Owner for payment.

ITEM 3 - STATE SPECIFIC SUPPLEMENTARY CONDITIONS

Utah

UTAH STATE SALES TAX:

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

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

UTAH NOTICE OF INTENT TO OBTAIN FINAL COMPLETION:

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

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

UTAH NOTICE OF COMPLETION:

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

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

UTAH STATE PROGRESS PAYMENTS AND FINAL PAYMENT:

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

5. Payment

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

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

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

- d. Owner may modify or reject any payment request if, in Owner's opinion, the Work for which payment is requested is not acceptable or is less complete than represented on the payment request.

- e. Upon receipt of any payment from Owner, Contractor will pay to each Subcontractor the amount paid to Contractor on account of such Subcontractor's portion of the Work.
- f. Contractor will maintain a copy of each payment request at the Project site for review by the Subcontractors.
- g. No payment made, either in whole or in part, by Owner will be construed to be an acceptance of defective or improper materials or workmanship.

END OF DOCUMENT

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

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

SECTION 01 1000 SUMMARY

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

SECTION 01 1200 MULTIPLE CONTRACT SUMMARY

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

SECTION 01 1400 WORK RESTRICTIONS

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

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

SECTION 01 3000 ADMINISTRATIVE REQUIREMENTS

A. Administrative Requirements:

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

SECTION 01 3100 PROJECT MANAGEMENT AND COORDINATION

A. Multiple Contract Coordination:

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

B. Project Meetings And Conferences:

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

SECTION 01 3300 SUBMITTAL PROCEDURES

A. Submittal Procedure:

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

B. Action Submittals:

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

- C. Informational Submittals:
1. Informational submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports, and other documentary data affirming quality of products and installations.
 - a. Return copies or PDF files marked with action taken and with corrections or modifications required.
- D. Closeout Submittals:
1. Submittals that occur during project closeout.

SECTION 01 3500 SPECIAL PROCEDURES

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

SECTION 01 4000 QUALITY REQUIREMENTS

- A. Administrative Requirements:
1. Conflicting Requirements:
 - a. If compliance with two or more standards is specified and standards establish different or conflicting requirements for minimum quantities or quality levels, comply with most stringent requirement.
 2. Minimum Quantity or Quality Levels:
 - a. Quantity or quality level shown or specified shall be the minimum provided or performed. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits.
 3. Submit to Owner permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records establishing compliance with standards and regulations bearing upon performance of the Work.
- B. Quality Assurance:
1. Testing and inspecting services are used to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
 2. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to verify compliance and guard against defects and deficiencies and substantiate that proposed construction will comply with requirements. Owner or Owner's designated representative(s) will perform quality assurance to verify compliance with Contract Documents.
 3. Notify Owner immediately if asbestos-containing materials or other hazardous materials are encountered while performing the Work.
- C. Quality Control:
1. Quality Control Services:
 - a. Quality Control will be sole responsibility of Contractor.
 - 1) Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements performed by Contractor.
 - a) They do not include inspections, tests or related actions performed by Architect or Owner Representative, governing authorities or independent agencies hired by Owner or Architect.
 - b) Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - 2) Where services are indicated as Contractor's responsibility, engage qualified Testing Agency to perform these quality control services:

- a) Contractor will not employ same testing entity engaged by Owner, without Owner's written approval.

D. Repair And Protection:

1. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
2. Protect construction exposed by or for Quality Assurance and Quality Control activities.
3. Repair and protection are Contractor's responsibility, regardless of assignment of responsibility for Quality Assurance and Quality Control Services.

SECTION 01 4301 QUALITY ASSURANCE - QUALIFICATIONS

A. Qualifications: Qualifications in this Section establish minimum qualification levels required; individual Specification Sections specify additional requirements:

1. Fabricator / Supplier / Installer Qualifications:
 - a. Firm experienced in producing products similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units:
 - 1) Where heading 'VMR (*Value Managed Relationship*) Suppliers / Installers' is used to identify list of specified suppliers or installers, Owner has established relationships that extend beyond requirements of this Project. No other suppliers / installers will be acceptable. Follow specified procedures to preserve relationships between Owner and specified suppliers / installers and advantages that accrue to Owner from those relationships.
 - 2) Where heading 'Acceptable or Approved Suppliers / Installers / Fabricators' is used to identify list of specified suppliers / installers / fabricators, use only one of listed suppliers / installers / fabricators. No others will be acceptable.
2. Factory-Authorized Service Representative Qualifications:
 - a. Authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
3. Installer Qualifications:
 - a. Firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with record of successful in-service performance.
4. Manufacturer Qualifications:
 - a. Firm experienced in manufacturing products or systems similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units.
5. Manufacturer's Field Services Qualifications:
 - a. Experienced authorized representative of manufacturer to inspect field-assembled components and equipment installation, including service connections.
6. Professional Engineer Qualifications:
 - a. Professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated:
 - 1) Engineering services are defined as those performed for installations of system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
7. Specialists:
 - a. Certain sections of Specifications require that specific construction activities will be performed by entities who are recognized experts in those operations:
 - 1) Specialists will satisfy qualification requirements indicated and will be engaged for activities indicated.
 - 2) Requirement for special will not supersede building codes and regulations governing the Work.
8. Testing Agency Qualifications:
 - a. Independent Testing Agency with experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - b. Testing Laboratory:
 - 1) AASHTO Materials Reference Laboratory (AMRL) Accreditation Program.
 - 2) Cement and Concrete Reference Laboratory (CCRL).

- 3) Nationally Recognized Testing Laboratory (NRTL): Nationally recognized testing laboratory according to 29 CFR 1910.7.
- 4) National Voluntary Laboratory (NVLAP): Testing Agency accredited according to National Institute of Standards and Technology (NIST) Technology Administration, U. S. Department of Commerce Accreditation Program.

SECTION 01 4523 TESTING AND INSPECTION SERVICES

A. Submittals:

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

B. Quality Assurance:

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

C. Quality Control:

1. Quality Control will be sole responsibility of Contractor. Contractor will be responsible for testing, coordination, start-up, operational checkout, and commissioning of all items of the Work included in Project. All costs for these services will be included in Contractor's cost of the Work.
2. Notify results of all Testing and Inspection performed by Contractor's independent Testing Agencies to Architect and/or Owner's Representative within 24 hours of test or inspection having been performed:
 - a. Testing and Inspection Reports will be distributed as follows:
 - 1) 1 copy to Owner's Representative.
 - 2) 1 copy to Architect.
 - 3) 1 copy to Consulting Engineer(s) (Engineer of Record).
 - 4) 1 copy to Authorities Having Jurisdiction (if required).
3. Contractor's Responsibility:
 - a. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents.
 - b. Tests and inspections that are not explicitly assigned to Owner are responsibility of Contractor.

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

D. Tests And Inspections - General:

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

- 3) Evaluation of results of tests including recommendations for action.
- c. Inspection Reports:
 - 1) Testing Agency will furnish "Inspection at Site" reports for each site visit documenting activities, observations, and inspections.
 - 2) Include notation of weather and climatic conditions, time and date conditions and status of the Work, actions taken, and recommendations or evaluation of the Work.
- d. Reporting Testing and Inspection (Conforming Work):
 - 1) Submit testing and inspection reports as required within twenty four (24) hours of test or inspection having been performed.
- e. Reporting Testing and Inspection Defective Work (Non-Conforming Work):
 - 1) Testing Agency, upon determination of irregularities, deficiencies observed or test failure(s) observed in the Work during performance of its services of test or inspection having been performed, will:
 - (a) Verbally notify results to Architect, Contractor, and Owner's Representative within one hour of test or inspection having been performed (if Defective Work (Non-Conforming Work) is incorporated into project).
 - (b) Submit written inspection report and test results as required within twenty four (24) hours of test or inspection having been performed.
- f. Final Report:
 - 1) Submit final report of tests and inspections at Substantial Completion, which identify unresolved deficiencies.

F. Architect's Responsibility:

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

G. Field Quality Control:

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

SECTION 01 5000 TEMPORARY FACILITIES AND CONTROLS

A. Administrative Requirements:

1. Contractor is responsible for security of materials, tools, and equipment. Do not permit others to use building keys provided by Owner. Safeguard building and contents while the Work is being performed and secure building when the Work is finished for day.
2. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and reduce possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result:
 - a. Avoid use of tools and equipment that produce harmful noise.
 - b. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near site.
 - c. Protect the Work, materials, apparatus, and fixtures from injury due to weather, theft, and vandalism.
3. Existing restroom facilities may be used by Contractor. Clean restrooms and portions of existing building used in accessing restrooms daily. If existing facilities are not usable, provide and maintain temporary sanitary toilet.

B. Temporary Barriers And Enclosures:

1. Protect existing trees and plants. Remove and replace vegetation that dies or is damaged beyond repair due to construction activities.
2. Erect adequate barricades, warning signs, and lights necessary to protect persons from injury or harm.
3. Provide temporary enclosures at exterior building openings for security and protection from weather, theft, and vandalism. Erect and maintain dust-proof partitions and enclosures as required to prevent spread of dust and fumes to occupied portions of building.
4. Proprietary Camera Services: In its absolute discretion, and with or without notice to Contractor, Owner may provide from time to time, but is not obligated to provide, one or more cameras on or about Project site and/or signage or notices of the same:
 - a. If provided by Owner, such camera(s) and/or signage and notices are solely for Owner's benefit and convenience and shall not be for benefit of Contractor, Subcontractor(s) or for any third person.

- b. Owner shall have no liability, obligation, or responsibility to Contractor, Subcontractors, or any third person relative to such camera(s), signage, or notices, or absence of camera(s), signage, or notices, including without limitation, installation, maintenance, operation, repair, testing, functionality, capacity, recording, monitoring, posting, etc., of the same (hereafter 'Proprietary Camera Services').
- c. Contractor, with Owner's prior consent (which shall not be unreasonably withheld), may relocate such camera(s), signage, or notices as necessary to not unreasonably, materially and physically interfere with work at Project Site.
- d. Contractor's obligations under Contract Documents, including but not limited to, Contractor's obligation for security of Project Site, are not modified by Owner's opportunity to provide, actually providing, or not providing Proprietary Camera Services and/or signage or notices regarding the same.
- e. This Specification Section does not preclude Contractor from providing its own camera(s), signage, or notices pursuant to terms and conditions of this Agreement. Neither does this Section reduce, expand or modify any other right or obligation of Owner pursuant to terms of this Agreement.

C. Utilities:

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

SECTION 01 6100 COMMON PRODUCT REQUIREMENTS

A. Administrative Requirements:

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

SECTION 01 6200 PRODUCT OPTIONS

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

- 1. Substitutions And Equal Products:
 - a. Generally speaking, substitutions for specified products and systems, as defined in Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
 - b. Approved Products / Manufacturers / Suppliers / Installers:
 - 1) Category One:
 - (a) Owner has established 'Value Managed Relationships' that extend beyond requirements of this Project. No substitutions or equal products will be allowed on this Project.
 - (b) Follow specified procedures to preserve relationships between Owner and specified manufacturers / suppliers and advantages that accrue to Owner from those relationships.
 - 2) Category Two:
 - (a) Owner has established National Contracts that contain provisions extending beyond requirements of this Project. No substitutions or equal products will be allowed on this Project.
 - (b) Follow specified procedures to preserve relationships between Owner and specified manufacturers / suppliers and advantages that accrue to Owner from those relationships.
 - 3) Category Three:
 - (a) Specified products are provided to Church Projects under a National Account Program. Use these products to preserve advantages that accrue to Owner from those programs. No substitutions or equal products will be allowed on this Project.

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

SECTION 01 6400 OWNER-FURNISHED PRODUCTS

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

SECTION 01 6600 DELIVERY, STORAGE, AND HANDLING REQUIREMENTS

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

SECTION 01 7000 EXECUTION REQUIREMENTS

- A. Administrative Requirements:

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

SECTION 01 7400 CLEANING AND WASTE MANAGEMENT

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

SECTION 01 7700 CLOSEOUT PROCEDURES

- A. General:

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

SECTION 01 7800 CLOSEOUT SUBMITTALS

- A. Administrative Requirements:
1. Project Record Documents:
 - a. Do not use record documents for construction purposes:
 - 1) Protect from deterioration and loss in secure, fire-resistive location.

- 2) Provide access to record documents for reference during normal Working hours.
 - b. Maintain clean, undamaged set of Drawings. Mark set to show actual installation where installation varies from the Work as originally shown. Give particular attention to concealed elements that would be difficult to measure and record at later date:
 - 1) Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
 - 2) Mark new information that is important to Owner, but was not shown on Contract Drawings.
 - 3) Note related Change Order numbers where applicable.
 2. As Built Record Drawings:
 - a. Provide two full-size sets of prints and PDF file of As Built Record Drawings to Facilities Management Office, printed from the updated AutoCAD drawing files or updated Revit model files, as specified by Owner, that have been modified to show actual dimensions and location of equipment, material, utility lines, and other work as actually constructed, based upon information provided by Contractor. Architect will submit updated As Built Record Drawings in PDF (ISO32000 format) to Owner. In addition, Architect will submit to Owner updated AutoCAD as built record drawing files with associated plot style tables or the Revit as built record model files, as specified by Owner.
- B. Operations And Maintenance Manual:
1. General:
 - a. Include closeout submittal documentation as required by Contract Documentation. Include only closeout submittals as defined in individual specification section.
 - b. Submittal Format: Digital copies unless otherwise noted, required for each individual specification section that include 'Closeout Submittals'.
 2. Project Manual:
 - c. Copy of complete Project Manual including Addenda, Modifications as defined in General Conditions, and other interpretations issued during construction:
 - (1) Mark these documents to show variations in actual Work performed in comparison with text of specifications and Modifications.
 - (2) Show substitutions, selection of options, and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.
 3. Maintenance Contracts: (digital format only).
 4. Operations and Maintenance Data (digital format only):
 - a. Operations and maintenance submittals includes cleaning instructions, maintenance instructions, operations instructions, equipment list, and parts lists.
 5. Warranty Documentation: Digital format of final, executed warranties.
 6. Record Documentation:
 - a. Documentation includes Certifications, color and pattern selections, Design Date, Geotechnical Evaluation Reports (soils reports), Manufacture Reports, Literature or cut sheets, Shop Drawings, Source Quality Control, Special Procedures, and Testing and Inspection Reports.
 7. Software: Audio and Video System software, programming and set-files.
 8. Irrigation Plan: Laminated and un-laminated reduced sized hard copies.
 9. Landscape Management Plan (LMP):
 - a. Irrigation Section:
 - (1) Documentation required by Sections under 32 8000 Heading: Irrigation.
 - b. Landscaping Section:
 - (1) Documentation required by Sections under 32 8000 Heading: Irrigation.
- C. Warranties:
1. When written guarantees beyond one (1) year after substantial completion are required by Contract Documents, secure such guarantees and warranties properly addressed and signed in favor of Owner. Include these documents in Operations & Maintenance Manual(s) specified above.
 2. Delivery of guarantees and warranties will not relieve Contractor from obligations assumed under other provisions of Contract Documents.

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DIVISION 03: CONCRETE

03 2000 CONCRETE REINFORCING

03 2100 REINFORCEMENT BARS

03 3000 CAST-IN-PLACE CONCRETE

03 3111 CAST-IN-PLACE STRUCTURAL CONCRETE
03 3112 CAST-IN-PLACE SIDEWALKS, CURBS AND GUTTERS
03 3923 MEMBRANE CONCRETE CURING

03 6000 GROUTING

03 6213 NON-METALLIC NON-SHRINK GROUT

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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 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 - 2. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
 - a. Reinforcement installed in concrete.
 - b. Pre-installation conference held jointly with other concrete related sections.

1.2 REFERENCES

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

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in pre-installation conference as specified in Section 03 3111.
 - 2. In addition to agenda items specified in Section 01 3100, and Section 03 3111, review following:
 - a. Installation scheduling and reinforcing placement.
 - b. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
 - 1) Review requirements and frequency of testing and inspections.
- B. Scheduling:
 - 1. Notify Testing Agency and Architect as directed in Section 03 3053 and Section 03 3111.

1.4 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Reinforcing placement drawings.
- B. Informational Submittals:
 - 1. Certificates:
 - a. Mill certificates for mill tests for reinforcing in accordance with ASTM A615/A615M.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Testing and Inspection Reports:
 - a) Testing Agency Inspection Reports of reinforcement bars.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Deliver bars separated by size and tagged with manufacturer's heat or test identification number.
 - 2. Reinforcement bars shall be free of heavy rust scales and flakes, or other coating at time of delivery and placing.
- B. Storage And Handling Requirements:
 - 1. Properly protect rebar on site after delivery.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Reinforcement Bars:

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

2.2 ACCESSORIES

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

2.3 FABRICATION

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

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
1. Avoid cutting or puncturing vapor retarder during reinforcement placement and concrete operations.
 2. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
 3. Blowtorch shall not be used to facilitate field cutting or bending or any other reinforcing work.
 4. Reinforcement shall not be bent after partially embedded in hardened concrete.
- B. Placing Reinforcement:
1. Comply with Concrete Reinforcing Steel Institute CRSI 'Manual of Standard Practice' recommended practice for 'Placing Reinforcing Bars' for details and methods of reinforcement placement and supports. and as herein specified.
 2. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations:
 - a. Locate and support reinforcing by chairs, runners, bolsters, bar supports, spacers, or hangers, as required as recommended by 'ACI Detailing Manual, except slab on grade work.
 - b. Support bars in slabs on grade and footings with specified bar supports around perimeter and at **4-1/2 feet** on center each way maximum to maintain specified concrete cover.
 - c. Install bar supports at bar intersections.
 3. Bend bars cold.
 4. Dowel vertical reinforcement for formed concrete columns or walls out of footing or structure below with rebar of same size and spacing required above.
 5. Securely anchor and tie reinforcement bars and dowels before placing concrete. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- C. Splices:
1. Non-Concrete Structural System:

- a. Avoid splices of reinforcement bars at points of maximum stress. Lap bars 60 bar diameters minimum unless dimensioned otherwise on Drawings. Run reinforcement bars continuous through cold joints.
 2. Concrete Structural System:
 - a. In beams, slabs, and walls, avoid splices of reinforcement bars at points of maximum stress.
 - b. Lap bars as follows:
 - 1) Compression Splices: 45 bar diameters minimum.
 - 2) Tension Splices: In accordance with ACI 318 Class B requirements.
 - 3) No splice shall be less than 20 inches (508 mm).
 - 4) For epoxy coated rebar, increase lap-splice lengths by 1.5 times those listed above.
 - c. In columns, splices in vertical bars are permitted only at floor levels or points of lateral support and shall consist of 45 bar diameter laps.
 - d. Run reinforcement bars continuous through cold joints.
- D. Tolerances:
1. Provide following minimum concrete cover for reinforcement as per ACI 318 or ACI 318M. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations:
 - a. Concrete cast against and permanently exposed to earth:
 - 1) Interior Slabs on Grade: 1 inches (25 mm). clear from top of slab at 4 inches (100 mm) slabs, 2 inches (50 mm) clear at 6 inches (150 mm) slabs.
 - 2) Sections other than Slabs: 3 inches (75 mm).
 - b. Concrete Exposed to Earth or Weather:
 - 1) No. 6 and Larger Bars: 2 inches (50 mm).
 - 2) No. 5 and Smaller Bars, W31 and D31 Wire: 1-1/2 inches (38 mm).

3.2 FIELD QUALITY CONTROL

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

END OF SECTION

SECTION 03 3111**CAST-IN-PLACE STRUCTURAL CONCRETE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install concrete work as described in Contract Documents including:
 - a. Quality of concrete used on Project but furnished under other Sections.
 - b. Concrete mix information and use of admixtures.
 - c. Field Quality Control Testing and Inspection requirements for concrete.
 - d. Pre-installation conference held jointly with other concrete related sections.
 - e. Sealants and curing compounds used with concrete.
 - f. Compact aggregate base for miscellaneous cast-in-place concrete.
 - g. Miscellaneous cast-in-place concrete and equipment pads.
- B. Products Installed But Not Furnished Under This Section:
1. Membrane Concrete Curing.
- C. Related Requirements:
1. Section 01 0000: 'General Requirements':
 - a. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
 - b. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 3. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
 4. Section 03 1511: 'Concrete Anchors and Inserts'.
 5. Section 03 2100: 'Reinforcement Bars'.
 6. Section 03 2116: 'Epoxy-Coated Reinforcement Steel Bars'.
 7. Section 03 3517: 'Concrete Sealer Finishing' for application of concrete sealers.
 8. Section 03 3923: 'Membrane Concrete Curing' for quality of curing materials used.
 9. Section 07 9213: 'Elastomeric Joint Sealant' for quality of sealants.
 10. 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.
 11. 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.
 12. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
 13. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
 14. Section 31 2323: 'Fill' for compaction procedures and tolerances.
 15. 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 117.1R-14: 'Guide for Tolerance Compatibility in Concrete Construction'.
 - b. Certifications:

- 1) ACI CP-1(16), *Technical Workbook for ACI Certification of Concrete Field Testing Technician-Grade 1*.
- 2) ACI CP-10(10), *Craftsman Workbook for ACI Certification of Concrete Flatwork Technician/Finisher*.
- 3) ACI CP-19(16), *Technical Workbook for ACI Certification of Concrete Strength Testing Technician*.

B. Definitions:

1. Cold Weather, as referred to in this Section, is four (4) hours with ambient temperature below **40 deg F (4.4 deg C)** in twenty-four (24) hour period.
2. Floor Flatness (F_F): Rate of change in elevation of floor over **12 inches (305 mm)** section.
3. Floor Levelness (F_L): Measures difference in elevation between two points which are **10 feet (3.05 m)** apart.
4. Hot Weather, as referred to in this Section, is ambient air temperature above **100 deg F (38 deg C)** or ambient air temperature above **90 deg F (32 deg C)** with wind velocity **8 mph (12.9 kph)** or greater.

C. Reference Standards:

1. American Association of State and Highway Transportation Officials:
 - a. AASHTO M 153-06 (2016), 'Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction'.
2. American Concrete Institute
 - a. ACI 117-10 (R2015): 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
 - b. ACI 305.1-14, 'Specification for Hot Weather Concreting'.
 - c. ACI 306.1-90 (R2002), 'Standard Specification for Cold Weather Concreting'.
 - d. ACI 318-14, 'Building Code Requirements for Structural Concrete' (ACI 318) and 'Commentary on Building Code Requirements for Structural Concrete' (ACI 318R).
3. ASTM International:
 - a. ASTM C31/C31M-19, 'Standard Practice for Making and Curing Concrete Test Specimens in the Field'.
 - b. ASTM C33/C33M-18, 'Standard Specification for Concrete Aggregates'.
 - c. ASTM C39/C39M-18, 'Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens'.
 - d. ASTM C94/C94M-17a, 'Standard Specification for Ready-Mixed Concrete'.
 - e. ASTM C140/C140M-18a, 'Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units'.
 - f. ASTM C143/C143M-15a, 'Standard Test Method for Slump of Hydraulic-Cement Concrete'.
 - g. ASTM C150/C150M-18, 'Standard Specification for Portland Cement'.
 - h. ASTM C172/C172M-17, 'Standard Practice for Sampling Freshly Mixed Concrete'.
 - i. ASTM C173/C173M-16, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method'.
 - j. ASTM C192/C192M-18, 'Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory'.
 - k. ASTM C231/C231M-17a, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method'.
 - l. ASTM C260/C260M-10a(2016), 'Standard Specification for Air-Entraining Admixtures for Concrete'.
 - m. ASTM C330/C330M-17a, 'Standard Specification for Lightweight Aggregates for Structural Concrete'.
 - n. ASTM C494/C494M-17, 'Standard Specification for Chemical Admixtures for Concrete'.
 - o. ASTM C496/C496M-17, 'Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens'.
 - p. ASTM C567/C567M-14, 'Standard Test Method for Determining Density of Structural Lightweight Concrete'.
 - q. ASTM C595/C595M-18, 'Standard Specification for Blended Hydraulic Cements'.
 - r. ASTM C618-19, 'Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete'.

- s. ASTM C1077-17, 'Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation'.
 - t. ASTM C1157/C1157M-17, 'Standard Performance Specification for Hydraulic Cement'.
 - u. ASTM D1751-18, 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)'.
 - v. ASTM E329-18: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
 - w. ASTM E1155-14, 'Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers'.
4. International Code Council (IBC) (2018 or latest approved edition):
- a. IBC Chapter 17, 'Special Inspections And Tests'.
 - 1) Section 1704, 'Special Inspections And Tests, Contractor Responsibility And Structural Observations'.
 - 2) Section 1705, 'Required Special Inspection And Tests'.
 - a) Section 1705.2, 'Steel Construction'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
1. Participate in MANDATORY pre-installation conference as specified in Section 01 3100 and held jointly with following sections:
 - a. Section 03 2100: 'Reinforcement Bars'.
 2. Schedule pre-installation conference prior to placing of footings, installation of foundation forms and reinforcing steel, and installation of anchors, dowels, inserts, and block outs in foundation walls and slabs.
 3. In addition to agenda items specified in Section 01 3100, review following:
 - a. Set up concrete placement pour card system and verify that all relevant trades have signed off prior to concrete placement.
 - b. Obtaining trade sign-offs on each pour card will be responsibility of General Contactor's foreman or whoever is in charge of ordering concrete.
 - c. Pour cards will be turned in to Quality Assurance representative after the work has been completed so that they can be reviewed and filed.
 - d. Review installation scheduling, coordination, placement of building concrete, and placement of items installed in and under concrete.
 - e. Review installation scheduling, coordination and placement of site concrete and of items installed in concrete.
 - f. Review 'Verification of Conditions' requirements.
 - g. Review requirements for preparation of subgrade and aggregate base requirements.
 - h. Review formwork requirements.
 - i. Review approved mix design requirements, mix designs and use of admixtures.
 - j. Review reinforcing bar submittals.
 - k. Review installation schedule and placement of reinforcing bars.
 - l. Review placement, finishing, and curing of concrete, including cold and hot weather requirements.
 - m. Review joint layout plan for control and expansion joints, fillers for sidewalks, curbs, and gutters:
 - 1) Review jointing requirements.
 - n. Review smooth rubbed concrete finish procedures and requirements (applied immediately after removing concrete formwork while concrete is 'green').
 - o. Review concrete slab tolerances and corrective measures if tolerances not met.
 - p. Review safety issues.
 - q. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
 - 1) Review requirements and frequency of testing and inspections.
- B. Scheduling:
1. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing concrete.

1.4 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. Shop Drawings:
 - a. Show dimensioned locations of anchor bolts for hold-down anchors and columns.
 - b. Show reinforcement and all necessary bending diagrams and reinforcing steel list, and construction joint locations.
 - c. Provide bar schedules and bending details.
 - d. Reinforced concrete walls shall be shown in scale elevation (scale at least one quarter inch to one foot). Details shall be in accordance with ACI rules.
 - e. Show all formwork for concrete surfaces which are to remain exposed in the finished work.
- B. Informational Submittals:
1. Certificates:
 - a. Installers:
 - 1) Certification for National Ready Mixed Concrete Association (NRMCA).
 - 2) Certification for ACI-certified Flatwork Finishers and Technicians.
 2. Design Data:
 - a. Mix Design:
 - 1) Furnish proposed mix design to Architect for review prior to commencement of Work.
 - a) Include density (unit weight) and void content determined per ASTM C1688/C1688M for fresh mixed properties and per ASTM C140/C140M for hardened concrete properties.
 - b) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use.
 - b. Ready-Mix Supplier:
 - 1) Require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job-site for use of Owner or his representatives. Tickets shall show following:
 - a) Name of ready-mix batch plant.
 - b) Serial number of ticket.
 - c) Date and truck number.
 - d) Name of Contractor.
 - e) Name and location of Project.
 - f) Specific class or designation of concrete conforming to that used in Contract Documents.
 - g) Amount of concrete.
 - h) Amount and type of cement.
 - i) Total water content allowed by mix design.
 - j) Amount of water added at plant.
 - k) Sizes and weights of sand and aggregate.
 - l) Time loaded.
 - m) Type, name, manufacturer, and amount of admixtures used.
 - n) Design Data.
 - 2) Provide certificates with supporting testing reports verifying compliance with Contract Document requirements and that materials provided are from single source for following:
 - a) Cement.
 - b) Aggregate.
 - c) Fly Ash.
 3. Source Quality Control Submittals:
 - a. Concrete mix design: Submit mix designs to meet following requirements:
 - 1) Mix Type B:
 - a) Unexposed interior concrete slabs on grade.
 - b) 3500 psi (24.13 MPa) minimum at twenty-eight (28) days.
 - c) Water / Cementitious Material: 0.45 maximum by weight.
 - 2) Mix Type E:
 - a) Exterior concrete exposed to freeze/thaw cycles and deicing salts or where soils are 'corrosive'.

- b) 4500 psi (31.03 MPa) minimum at twenty-eight (28) days.
 - c) Water / Cementitious Material: 0.40 maximum by weight.
 - d) Use twenty-five (25) percent Class F fly ash as part of cementitious material.
 - e) Mix Type F should be used for all exterior concrete exposed to freeze/thaw cycles and deicing salts, unless dictated otherwise by site conditions.
 - f) For concrete paving, use mix design based upon use of 1-1/2 inches (38 mm) coarse aggregate (about 15 percent).
- 3) Air Entrainment: Six (6) percent, plus or minus 1-1/2 percent for exterior concrete and foundation walls exposed to freeze/thaw cycles.
 - 4) Do not add water any time during mixing cycle above amount required to meet specified water / cement ratio. No reduction in amount of cementitious material is allowed.
- b. Slump:
 - 1) 4 inch (100 mm) slump maximum before addition of high range water reducer.
 - 2) 8 inch (200 mm) slump maximum with use of high range water reducer.
 - 3) Slump not required for Mix Type G.
 - c. Admixtures:
 - 1) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use. Do not use any admixture without Architect's written approval.
 - 2) Fly ash: Amount of specified Class F (or Class C where Class F is not available) fly ash not to exceed twenty-five (25) percent of weight of cementations materials may used.
 - 3) Chemical:
 - a) Specified accelerator or retarder may be used if necessary to meet environmental conditions.
 - b) Special additives to promote rapid drying concrete, or moisture vapor reduction (MVRA), may be used in interior concrete slabs on grade and elevated concrete decks that will receive flooring if necessary to meet construction schedules.
- C. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Pour Reports:
 - a) Provide report that records following information:
 - b) Date and time of start of pour, Date and time of end of pour, and Date and time of end of finishing procedures.
 - c) Temperature at start of pour, Temperature at end of Pour, and Maximum temperature during performance of finishing procedures.
 - d) Wind speed at start of pour, Wind speed at end of pour, and Maximum wind speed during performance of finishing procedures.
 - e) Humidity at start of pour, Humidity at end of pour, and High and low humidity during performance of finishing procedures.
 - f) Cloud cover at start of pour, Cloud cover at end of pour, and High and low cloud cover during performance of finishing procedures.
 - g) Screeding method and equipment used.
 - h) Saw cut method and equipment used.
 - 2) Testing and Inspection Reports:
 - a) Testing Agency Testing and Inspecting Reports of concrete.
 - 3) Warranty. Submit rapid concrete drying or MVRA manufacturer warranties for concrete moisture vapor emission induced flooring failure and adhesion; ensure both have been completed in project's name and registered with manufacturer.
 - a) Provide warranty to cover cost of flooring failures due to moisture migration from slabs for life of concrete. Include cost of repair or removal of failed flooring, placement of topical moisture remediation system, and replacement of flooring with comparable flooring system.
 - b) Provide stand-alone adhesion warranty matching duration of flooring adhesive or primer manufacturer's material defect warranty.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 SYSTEM

- A. Manufacturers:
1. Manufacturer Contact List:
 - a. Aridus Admixture by US Concrete, Euless, TX www.us-concrete.com/aridus/.
 - b. BASF (Construction Chemicals Division), Cleveland, OH www.master-builders-solutions.basf.us/en-us.
 - c. Bonsal American, Charlotte, NC www.bonsal.com.
 - d. Concure Systems Admixture by Concure Systems, Phoenix, AZ www.ConcureSystems.com.
 - e. Dayton Superior Specialty Chemicals, Kansas City, KS www.daytonsuperiorchemical.com.
 - f. Euclid Chemical Company, Cleveland, OH www.euclidchemical.com.
 - g. Fritz-Pak Concrete Admixtures, Dallas, TX www.fritzpak.com.

- h. GCP Applied Technologies, Cambridge, MA www.gcpat.com/construction/en-us.
 - i. ISE Logik Industries, Gulfport, MS www.iselogik.com.
 - j. Kryton International Inc., Vancouver, British Columbia, Canada www.kryton.com.
 - k. L & M Construction Chemicals, Omaha, NE www.lmcc.com.
 - l. Larsen Weldcrete by Larsen Products Corp, Rockville, MD www.larsenproducts.com.
 - m. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com and Sika Canada, Pointe Claire, QC www.sika.ca.
 - n. Unitex, Kansas City, MO www.unitex-chemicals.com.
 - o. U S Mix Products Co, Denver, CO www.usspec.com.
 - p. W R Meadows, Hampshire, IL www.wrmeadows.com.
- B. Performance:
- 1. Design Criteria: Conform to requirements of ASTM C94/C94M unless specified otherwise:
 - 2. Capacities:
 - a. For testing purposes, following concrete strengths are required:
 - 1) At 7 days: 70 percent minimum of 28 day strengths.
 - 2) At 28 days: 100 percent minimum of 28 day strengths.
- C. Materials:
- 1. Hydraulic Cement: Meet requirements of ASTM C150/C150M, Type **<Insert Type>**.
 - a. Meet requirements of ASTM C595/C595M, Type **<Insert Type>**.
 - b. Meet requirements of ASTM C1157/C1157M, Type **<Insert Type>**.
 - 2. Aggregates:
 - a. General:
 - 1) Aggregates for all concrete shall come from a quarry that is DOT approved and meets or exceeds durability Class I aggregate. The quarry shall submit a letter to Engineer that certifies that all aggregate complies with DOT requirements for durability. Aggregate not meeting DOT durability requirements shall not be used.
 - b. Coarse:
 - 1) Meet requirements of ASTM C33/C33M or nonconforming aggregate that by test or actual service produces concrete of required strength and conforms to local governing codes.
 - 2) Aggregate shall be uniformly graded by weight.
 - c. Fine:
 - 1) Meet requirements of ASTM C33/C33M.
 - 2) Aggregate shall be uniformly graded by weight.
 - 3. Water: Clear, apparently clean, and potable.
 - 4. Admixtures And Miscellaneous:
 - a. Fly Ash:
 - 1) Meet requirements of ASTM C618, Class F (or Class C where Class F is not available) and with loss on ignition (LOI) of three (3) percent maximum.
 - b. Chemical:
 - 1) No admixture shall contain calcium chloride nor shall calcium chloride be used as an admixture. All chemical admixtures used shall be from same manufacturer and compatible with each other.
 - 2) Air Entraining Admixture:
 - a) Meet requirements of ASTM C260/C260M.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
 - 3) Water Reducing Admixture:
 - a) Meet requirements of ASTM C494/C494M, Type A and containing not more than 0.05 percent chloride ions.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
 - 4) Water Reducing, Retarding Admixture:
 - a) Meet requirements of ASTM C494/C494M, Type D and contain not more than 0.05 percent chloride ions.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.

- 5) High Range Water Reducing Admixture (Superplasticizer):
 - a) Meet requirements of ASTM C494/C494M, Type F or G and containing not more than 0.05 percent chloride ions.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
- 6) Non-Chloride, Non-Corrosive Accelerating Admixture:
 - a) Meet requirements of ASTM C494/C494M, Type C or E and containing not more than 0.05 percent chloride ions.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
- 7) Corrosion Inhibiting Admixture:
 - a) Liquid admixture to inhibit corrosion of steel reinforcement in concrete by introducing proper amount of anodic inhibitor. Admixture shall contain thirty (30) percent calcium nitrite solution and shall be used where called for in specifications or on drawings.
 - b) Type Two Acceptable Products:
 - (1) Eucon CIA by Euclid.
 - (2) DCI or DCI-S by GCP Applied Technologies.
 - (3) Equal as approved by Architect before use. See Section 01 6200.
- 8) Alkali-Silica Reactivity Inhibiting Admixture:
 - a) Specially formulated lithium nitrate admixture for prevention of alkali-silica reactivity (ASR) in concrete. Admixture must have test data indicating conformance to ASTM C1293.
 - b) Type Two Acceptable Products:
 - (1) Eucon Integral ARC by Euclid.
 - (2) RASIR by W R Grace.
 - (3) Equal as approved by Architect before use. See Section 01 6200.
- 9) Viscosity Modifying Admixture (VMA):
 - a) Liquid admixture used to optimize viscosity of Self-Consolidating Concrete (SCC). Subject to compliance with requirements, provide following at dosage rates per manufacturer's recommendation.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
- 10) Shrinkage Reducing Admixture (SRA):
 - a) Liquid admixture specifically designed to reduce drying shrinkage and potential for cracking.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
- 11) Rapid Drying Admixture in Interior Concrete Slabs on Grade:
 - a) Admixture specifically designed to promote rapid drying of concrete.
 - b) Type Two Acceptable Products:
 - (1) Equal as approved by Architect before use. See Section 01 6200.
- 12) Moisture Vapor Reduction Admixture (MVRA):
 - a) Liquid, inorganic, ASTM C494/C494M Type S Admixture free of volatile organic compounds (VOCs); specifically formulated to close capillary systems formed during concrete placement and to reduce moisture vapor emission and transmission with no adverse effect on concrete properties or finish flooring.
 - b) Type Two Acceptable Products:
 - (1) MVRA 900 by ISE Logik Industries: www.iselogik.com.
 - (2) Concure Systems Admixture by Concure Systems, Phoenix, AZ www.ConcureSystems.com.
 - (3) Equal as approved by Architect before use. See Section 01 6200.
- 13) Waterproofing Admixture: Admixture formulated to reduce permeability to liquid water, with no adverse effect on concrete properties:
 - a) Functioning by growth of crystals in capillary pores.
 - b) Permeability of Cured Concrete: No measurable leakage when tested in accordance with COE CRD-C 48 at 200 feet of head; provide test reports.
 - c) Type Two Acceptable Products:
 - (1) CWPA 800 by ISE Logik Industries: www.iselogik.com.
 - (2) Krystol Internal Membrane (KIM) by Kryton: www.kryton.com.

- (3) Equal as approved by Architect before use. See Section 01 6200.

2.2 ACCESSORIES

- A. Formwork:
1. Meet requirements specified in Section 03 1113:
- B. Bonding Agents:
1. Type Two Acceptable Products:
 - a. Acrylic Additive by Bonsal American.
 - b. Day Chem Ad Bond (J-40) by Dayton Superior.
 - c. Flex-Con by Euclid Chemical Co.
 - d. Larsen Weldcrete by Larsen Products Corp.
 - e. Everbond by L & M Construction Chemicals.
 - f. MasterEmaco A 660 (formally Acryl 60) by BASF.
 - g. U S Spec Multicoat by U S Mix Products.
 - h. Intralok by W R Meadows.
 - i. Equal as approved by Architect before use. See Section 01 6200.
- C. Expansion Joint Filler:
1. Expansion Joint Filler Material:
 - a. Design Criteria:
 - 1) Resilient, flexible, non-extruding, expansion-contraction joint filler meeting requirements of ASTM D1751.
 - 2) **1/2 inch (12.7 mm)** thick.
 - 3) Resilience:
 - a) When compressed to half of original thickness, recover to minimum of seventy (70) percent of original thickness.
 - b. Type Two Acceptable Products:
 - 1) Fiber Expansion Joint by W R Meadows, Hampshire, IL www.wrmeadows.com.
 - 2) Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Concrete Mixing:
1. General:
 - a. All concrete shall be machine mixed.
 - b. Water gauge shall be provided to deliver exact predetermined amount of water for each batch.
 - c. Reliable system must be employed to insure that no less than predetermined amount of cement goes into each batch.
 - d. Re-tempering partly set concrete will not be permitted.
 2. Transit Mix:

- a. Transit mix concrete may be used provided it conforms to Specifications and tests herein described and ASTM C94/C94M.
 - b. Central plant producing concrete and equipment transporting it are suitable for production and transportation of controlled concrete and plant is currently approved by local state DOT.
 - c. Maximum elapsed time between time of introduction of water and placing shall be one (1) hour.
 - d. Minimum time of mixing shall be one (1) minute per cubic yard after all material, including water, has been placed in drum, and drum shall be reversed for an additional two (2) minutes.
 - e. Mixing water shall be added only in presence of Inspecting Engineer or inspector employed by Testing Agency.
 - f. Trucks shall not be overloaded in excess of rated capacity as recommended by manufacturer.
3. Cold Weather Concreting Procedures:
- a. General Requirements:
 - 1) Materials and equipment required for heating and protection of concrete shall be approved and available at Project site before beginning cold weather concreting.
 - 2) Forms, reinforcement, metallic embedments, and fillers shall be free from snow, ice, and frost. Surfaces that will be in contact with newly placed concrete, including sub-grade materials, shall be **35 deg F (2 deg C)** minimum at time of concrete placement.
 - 3) Thaw sub-grade **6 inches (150 mm)** deep minimum before beginning concrete placement. If necessary, re-compact thawed material.
 - 4) Use no frozen materials or materials containing ice.
 - 5) See ACI 306.1 'Standard Specification for Cold Weather Concreting' for additional requirements.
4. Hot Weather Concreting Procedures:
- a. General:
 - 1) Maximum concrete temperature allowed is **90 deg F (32 deg C)** in hot weather.
 - 2) Cool aggregate and subgrades by sprinkling.
 - 3) Avoid cement over **140 deg F (60 deg C)**.
 - 4) Use cold mixing water or ice.
 - 5) Use fog spray or evaporation retardant to lessen rapid evaporation from concrete surface.
 - 6) See ACI 305.1 'Specification for Hot Weather Concreting' for additional requirements.
- B. Surface Preparation:
1. Earthwork Preparation:
 - a. Aggregate base and subgrade:
 - 1) Prepare aggregate base as specified in Section 31 1123.
 - 2) Prepare natural soil subgrade as specified in Section 31 2213.
 - 3) Prepare fill subgrade as specified in Section 31 2323.
 2. Install inserts, bolts, boxes, templates, pipes, conduits, and other accessories furnished under other Sections to be installed as part of work of this Section:
 - a. Tie anchor bolts for hold-down anchors and columns securely to reinforcing steel.
- C. Removal:
1. Remove water and debris from space to be placed:

3.3 INSTALLATION

- A. Placing Concrete:
1. General:
 - a. Place as soon after mixing as possible.
 - b. Deposit as nearly as possible in final position.
 - c. No concrete shall be deposited in water.
 - d. Placing of concrete shall be continuous until panel or section is complete.
 - e. Compact concrete in forms by vibrating and other means where required.
 - 1) Thoroughly consolidate concrete around reinforcing bars (Consolidation not required in concrete around reinforcing bars with Mix Type G).
 - 2) Use and type of vibrators shall conform to ACI 309.

- f. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree into landscaped areas.
 - g. Consolidate concrete thoroughly.
 - h. Do not embed aluminum in concrete.
 - i. Do not use contaminated, deteriorated, or re-tempered concrete.
 - j. Avoid accumulation of hardened concrete.
 - k. Dusting with cement not permitted.
2. Miscellaneous Concrete Elements:
- a. Sidewalks, Exterior Stairs, And Landings:
 - 1) Slope with cross slope of **1/8 to 1/4 inch per ft (3 to 6 mm per 300 mm)** (one to two percent) in direction of intended drainage.
 - 2) Slope away from building **1/8 to 1/4 inch per ft (3 to 6 mm per 300 mm)** (one to two percent) minimum.
 - 3) Concrete walks shall be screeded to bring surface to grades and lines as indicated. Surface shall be floated with wood float with no coarse aggregate showing and then given broom finish before concrete sets.
3. Joints:
- a. Control Joints (Contraction Joints):
 - 1) Form control joints with early-entry, dry-cut saws as soon as final trowel operations are complete, and joints can be cut without raveling.
 - 2) Control joints in Concrete Paving are specified in Section 32 1313.
 - 3) Depth of control joints shall be approximately one quarter of concrete slab thickness, but not less than **one inch (25 mm)**.
 - 4) Control joints to be hand tooled in sidewalks, curbs and gutters, mow strips, and aprons.
 - 5) Table One:

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

- b. Expansion Joints:
 - 1) Expansion joints in Concrete Paving are specified in Section 32 1313.
 - 2) Install so top of expansion joint material is **1/4 inch (6 mm)** below finished surface of concrete.
 - 3) No expansion joint required between curbs and sidewalks parallel to curb.
 - 4) Provide expansion joints at ends of exterior site concrete elements that are perpendicular to and terminate at curbs, building foundations or other concrete elements (i.e. sidewalks, mow strips, aprons).
 - 5) Provide expansion joints between sidewalks that are parallel, and adjacent, to storage building or main building.
 - 6) Provide expansion joints around perimeter of concrete slab on grade at mechanical enclosure, around perimeter of slab on grade at dumpster enclosure and at top and bottom of exterior stairs.
 - 7) Table Two:

Concrete Expansion Joint (Isolation) On-Center Spacing (+/-)		
Sidewalks, Curbs and Gutters	40 feet to 100 feet	12 meters to 30 meters
Mow Strips and Aprons	20 feet to 40 feet	6 meters to 12 meters

- 8) Seal expansion joints as specified in Section 07 9213 for following areas:
 - a) Between entryway slabs and building foundations.
 - b) Between sidewalks and building foundations.
 - c) Within curbs and gutters.
 - d) Within flat drainage structures and at joints between flat drainage structures and other concrete elements.
 - 9) Expansion joints are not required to be sealed for following areas:
 - a) Within aprons and where apron abuts sidewalks.
 - b) Within mow strips and where mow strip abuts building foundation and sidewalks.
 - c) Within sidewalks.
 4. 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.
 5. Anchor Bolts:
 - a. Place anchor bolts not tied to reinforcing steel immediately following leveling of concrete. Reconsolidate concrete around bolt immediately after placing bolt.
 - b. Do not disturb bolts during finishing process.
- B. Finishing:
1. Interior Concrete Flatwork:
 - a. Screed Concrete.
 - b. Float Finish:
 - 1) Float as soon after screeding as possible.
 - 2) Consolidate surface with power-driven floats with exception of areas inaccessible to power-driven floats, which may be hand-floated.
 - 3) Re-straighten, cutting down high spots and filling low spots.
 - 4) Repeat float passes and re-straightening until surface has uniform, smooth, granular texture.
 - c. Rough:
 - 1) Top of building slab to receive setting bed for ceramic or paver tile.
 - d. Trowel Finish:
 - 1) Steel trowel slab after concrete has set enough to avoid bringing water and fines to surface.
 - 2) Perform troweling with power-driven trowels with exception of areas inaccessible to power-driven trowels, which may be hand-troweled.
 - 3) Continue troweling passes and re-straightening with 10 foot (3 meter) highway straightedge until surface is free of trowel marks and uniform in texture and appearance.
 - 4) Apply burnished, burned-out trowel finish.
 2. Exterior Concrete Flatwork:
 - a. Curb, Gutter, Sidewalks, Mow Strips, Flat Drainage Structures, Stairs, And Miscellaneous:
 - 1) After completion of final floating, performed immediately after screeding and when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
 - a) Provide fine hair finish where grades are less than 6 percent 1-1/4 inch (32 mm).
 - b) Provide rough hair finish where grades exceed 6 percent 1-1/4 inch (32 mm).
 - c) Broom finish, by drawing broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide fine line texture acceptable to Architect. At curb and gutter, apply broom finish longitudinal to curb and gutter flowline.
 - d) On inclined slab surfaces, provide coarse, non-slip finish by scoring surface with stiff-bristled broom, perpendicular to line of traffic. At curb and gutter, apply broom finish longitudinal to curb and gutter flowline.
 - e) Do not remove forms for twenty-four (24) hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.
 - f) Round edges exposed to public view to 1/2 inch (13 mm) radius, including edges formed by expansion joints.
 - g) Remove edger marks.

C. Curing:

1. Membrane Concrete Curing:

- a. As specified in Section 09 3923 'Membrane Concrete Curing'.
- b. Follow Manufacturer's written instructions for preparation, application rates, placement, and cleanup:
 - 1) Apply as soon as troweling on interior concrete is complete.
 - 2) Apply as soon as brooming or finishing of exterior concrete is complete.
 - 3) Spraying application is required.
 - 4) Do not dilute or thin product.
 - 5) Do not apply when temperature of concrete is less than 40 deg F (4.4 deg C).
 - 6) Apply uniformly without puddles or ponding.
 - 7) Do not apply before bleed water has dissipated.
 - 8) Do not apply over standing water.

D. Exterior Concrete Sealer:

1. Exterior Concrete Sealer:

- a. Exterior concrete placed after about September 1 and located in areas of freeze/thaw cycles and deicing salts are to be sealed per Section 03 3517 'Exterior Concrete Sealer'.
- b. Apply product as specified in Section 03 3517.

E. Tolerances:

1. General:

- a. Tolerances shall conform to requirements of ACI 117 or CSA A23.1/A23.2, except where specified differently:
 - 1) Floor test surfaces shall be measured and reported within seventy two (72) hours after completion of slab concrete finishing operations and before removal of any supporting shores to eliminate any curling effect F-numbers.
- b. Maximum Variation Tolerances:
 - 1) Table Three:

Maximum Variation Tolerances		
Thickness, standard	plus 3/8 inch, minus 1/4 inch	plus 9.5 mm, minus 3 mm
Plan, 0 - 20 feet	1/2 inch	12.7 mm
Plan, 40 feet or greater	3/4 inch	19 mm

2. Local Flatness / Levelness of Interior Slabs:

a. Tile Areas:

- 1) Specified Overall Value of F_F25 / F_L20 and Minimum Local Value of F_F15 / F_L13 when tested in accordance with ASTM E1155.
- 2) Specified Overall Value of F_F30 / F_L20 and Minimum Local Value of F_F18 / F_L13 when tested in accordance with ASTM E1155 in ceramic, resilient or vinyl tiled areas.
- 3) Used on building slabs to be covered by carpet and tile as shown on Contract Drawings. Verify and coordinate with Finish Schedule.
- 4) Remedy For Out-of-Tolerance Building Slabs:
 - a) Sections of building slabs which do not meet specified tolerances but are within ten (10) percent of specified tolerances, may be corrected by grinding or filling, at Owner's option.
 - b) Remove and replace sections of slabs measuring outside specified correctable tolerances.
 - c) Carpet areas: If floor leveling compounds or concrete patching compounds are required to bring floor into specified tolerances, they will be provided by Owner in conjunction with carpet installation and back-charged to Contractor.

b. Wood Flooring Areas:

- 1) Specified Overall Value of F_F50 / F_L33 and Minimum Local Value of F_F30 / F_L20 when tested in accordance with ASTM E1155.
- 2) Used on Cultural Hall building slabs as shown on Contract Drawings. Verify and coordinate with Finish Schedule.

- 3) Remedy For Out-of-Tolerance Building Slabs:
 - a) Sections of slabs to be covered by wood flooring, which do not meet specified tolerances but are within ten (10) percent of specified tolerances, may be corrected by grinding or filling, at Owner's option.
 - b) Remove and replace sections of slabs measuring outside specified correctable tolerances.
 - c) If floor leveling compounds or concrete patching compounds are required to bring floor into specified tolerances in wood flooring areas, they will be provided by Owner in conjunction with carpet installation and back-charged to Contractor.

3.4 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor:
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
 - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
 2. Reinforcement Bars and Bolts:
 - a. Testing Agency shall provide inspections will include following:
 - 1) Bolts:
 - a) Inspection of bolts to be installed in concrete prior to and during placement of concrete.
 - b) Periodic inspection of anchors installed in hardened concrete.
 - 2) Reinforcement Bars:
 - a) Periodic inspection of reinforcement bars and placement prior to concrete placement to verify grade, size, cover, spacing, and position of reinforcing.
 - b) Inspect that all reinforcement bars are be positively identified as to heat number and mill analysis.
 - c) Confirm surface of reinforcing bars is free of form release oil or other deleterious substances.
 3. Concrete:
 - a. Testing Agency shall provide testing and inspection for concrete as per ASTM C1077.
 - b. Testing and inspections, if performed, will include following:
 - 1) Periodic inspection verifying use of required design mix.
 - 2) Inspection of reinforcing bars and anchor bolts before placement of concrete for proper installation.
 - 3) Inspection at time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine temperature of concrete.
 - 4) Inspection of concrete placement for proper application techniques.
 - a) Steel tools are not to be used on exterior concrete.
 - 5) Periodic inspection for maintenance of specified curing temperature and techniques:
 - a) Steel tools are not to be used on exterior concrete. Bull floating and finish floating is to be performed with magnesium or wood floats.
 - 6) Periodic inspect of formwork for shape, location and dimensions of concrete member being formed:
 - a) Certified Inspector shall inspect forms for general location, configuration, camber, shoring, sealing of form joints, correct forming material, concrete accessories, and form tie locations.
 - 7) Periodic inspection of concrete finishing operations for proper finishing techniques.
 - 8) Periodic inspection for placement of specified curing compounds.
 - c. Testing Agency will sample and test during placement of concrete as directed by Architect and may include following:
 - 1) Sampling Fresh Concrete: ASTM C172/C172M, except modified for slump to comply with ASTM C94/C94M:
 - a) Slump: ASTM C143/C143M, test each time set of compressive specimens are made.

- b) Air Content: ASTM C173/C173M, volumetric method for lightweight or normal weight concrete: ASTM C231/C231M, pressure method for normal weight concrete each time set of compression test specimens are made.
 - c) Concrete Temperature: Test each time set of compressive specimens are made.
 - d) Unit Weight: ASTM C567/C567M, test each time set of compressive specimens are made.
- 2) Concrete floor flatness and floor levelness of interior slabs as per ASTM E1155.
 - 3) Concrete moisture and alkalinity testing. See Section 09 0503 Flooring Substrate Preparation.
- d. Compression Test Specimen: ASTM C31/C31M, one (1) set of four (4) standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
 - e. Compressive Strength Tests: ASTM C39/C39M:
 - 1) Obtain one (1) composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd (4 cu m), but less than 50 cu. yd (38 cu m), plus one (1) set for each additional 50 cu. yd (38 cu m) or fraction thereof.
 - 2) One (1) specimen tested at seven (7) days, two (2) specimens tested at twenty-eight (28) days, and one (1) specimen retained in reserve for later testing if required.
 - 3) If strength of field-cured cylinders is less than eighty-five (85) percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing in-place concrete.
 - 4) Strength level of concrete will be considered satisfactory if averages of sets of three (3) consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi (3.45 MPa).
 - f. Samples:
 - 1) Fresh Concrete: ASTM C172/C172M except modified for slump to comply with ASTM C94/C94M.
 - a) Slump: ASTM C143/C43M, test each time set of compressive specimens are made.
 - b) Air Content: ASTM C173/C173M, volumetric method for lightweight or normal weight concrete: ASTM C231/C231M, pressure method for normal weight.
 - c) Concrete Temperature: Test each time set of compressive specimens are made.
 - d) Unit Weight: ASTM C567/C567M, test each time set of compressive specimens are made.
- B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
 - 1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.

3.5 CLEANING

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

3.6 PROTECTION

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

1. Restrict foot or vehicle traffic as curing membrane dries as recommended by Manufacturer.

END OF SECTION

SECTION 03 3517**CONCRETE SEALER FINISHING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install Concrete Sealer on concrete surfaces as described in Contract Documents including:
 - a. Concrete sealers are used on existing or new exterior concrete surfaces exposed to freeze/thaw cycles and deicing salts or where exterior concrete is placed after about September 1st or as otherwise desired by Project Manager or Facilities Manager.
 - 1) Concrete sealer on exterior concrete is not needed or used in areas not exposed to freeze/thaw cycles and deicing salts.
- B. Related Requirements:
1. Section 03 3111: 'Cast-In-Place Structural Concrete' for concrete mix information and use admixtures.
 2. Section 03 3923: 'Membrane Concrete Curing for curing application.
 3. Section 07 9213: 'Elastomeric Joint Sealant' for quality of sealants'.

1.2 REFERENCES

- A. Definitions:
1. Concrete Sealers: As used in this specification, are sealers applied to concrete surfaces to protect from surface damage, corrosion, and staining. Sealers either block pores in concrete to reduce absorption of water and salts or form impermeable layer which prevents such materials from passing. Concrete sealer, when selected and applied properly, will prevent intrusion of water and deicers, minimizing freeze/thaw damage.
- B. Reference Standards:
1. American Association of State and Highway Transportation Officials:
 - a. AASHTO T 259-02(2012), 'Standard Method of Test for Resistance of Concrete to Chloride Ion'.
 - b. AASHTO T 260-97(2011), 'Standard Method of Test for Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials'.
 2. ASTM International:
 - a. ASTM C672/C672M-12 'Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals'.
 3. German Institute for Standardization (DIN Standards):
 - a. DIN EN 1504-2,' Products and systems for the protection and repair of concrete structures - Definitions, requirements, quality control and evaluation of conformity - Part 2: Surface protection systems for concrete (2005).

1.3 ADMINISTRATIVE REQUIREMENTS

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

1.4 SUBMITTALS

- A. Action Submittals:

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

1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
 1. Comply with applicable VOC standards and other local requirements.
- B. Qualifications:
 1. Applicator:
 - a. Applicator shall be acceptable to Manufacturer as applicator of its product.
 - b. Minimum five (5) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding. Include contact information of person with oversight of each project.
 - c. Provide qualification documentation.
- C. Mockup:
 1. Required for all projects. Scheduled as per pre-installation conference.
 2. Mockup shall be representative of work to be expected.
 3. Mockup will be used to judge workmanship, concrete substrate preparation, operation of equipment, material application.
 4. Square footage or size of mock up is between Architect/Owner's Representative and Concrete Sealer Applicator. Consider between **10 sq ft to 20 sq ft (0.93 to 1.86 sq m)** for small projects and **100 sq ft to 200 sq ft (9.3 to 18.6 sq m)** for larger areas.
 5. Provide as many field mockups required to verify selections made under submittals and to demonstrate effects of concrete sealer. Approval does not constitute approval of deviations from Contract Documents, unless such deviations are specifically approved by Architect/Owner's Representative in writing.
 6. Install mockup in accordance with specification using same materials, staff and equipment.
 7. Use same personnel that will be doing project, including Supervisor.
 8. Approvals should be based on:
 - a. Compliance with approved submittals.
 9. Approval from Architect/Owner's Representative is required BEFORE starting work on Project.
 10. Allow twenty four (24) hours for inspection of mockup before proceeding with work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
 1. Follow Manufacturer's written instructions for handling and storage of product:

- a. Store in unopened containers in clean, dry area between 35 deg F (2 deg C) and 110 deg F (43 deg C) or as directed by Manufacturer's instruction.

1.7 FIELD CONDITIONS

A. Ambient Conditions:

1. Sterilant:
 - a. Follow printed Manufacturer's instruction for environmental hazards:
 - b. Follow printed Manufacturer's instruction for ambient conditions for application of product.
2. Concrete Sealer:
 - a. Follow printed Manufacturer's instruction for environmental hazards:
 - b. Follow printed Manufacturer's instruction for ambient conditions for application of product including:
 - 1) Minimum and maximum application temperatures.
 - 2) Application precautions when rain is expected.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Sterilant:

1. General: Sterilant is required where weed and other live vegetation matter is present.
2. Type One Acceptable Product:
 - a. Arsenal.
 - b. Mixture of Roundup and Primatol.
 - c. Equal as approved by Architect/Owner's Representative before bidding. See Section 01 6200.

B. Exterior Concrete Sealer:

1. Description:
 - a. Concrete sealer that protects new and existing exterior concrete from freeze/thaw cycles and deicing salts.
2. Design Criteria:
 - a. General:
 - 1) Penetrating water repellent silane or linseed oil/mineral spirit concrete sealers are to be used.
 - 2) Siloxanes are not to be used to replace silane or linseed oil/mineral spirits sealers.
 - b. Linseed Oil/Mineral Spirits Sealers:
 - 1) Protects concrete from freeze/thaw cycles and deicing salts.
 - 2) Resists penetration of water and deicing salts.
 - c. Silane Based Sealers:
 - 1) Protects concrete from freeze/thaw cycles and deicing salts.
 - 2) Resists penetration of water and deicing salts.
 - 3) 100 percent silane active ingredient content.
 - 4) Penetrating sealer.
 - 5) Water repellent.
 - 6) Clear (colorless, non-yellowing). Surface appearance after application: unchanged.
3. Limitations:
 - a. VOC:
 - 1) If Low VOC product are required or desired, use only those products listed as 'Low VOC' in acceptable products below.
4. Type One Acceptable Products. See Section 01 6200 for definition of Categories. Applicator Option:
 - a. Linseed Oil/Mineral Spirits Sealers:
 - 1) Anti Spall J33 Concrete Sealer by Dayton Superior Corporation, Miamisburg, OH www.daytonsuperior.com.
 - a) Low VOC.

- 2) Equal product meeting design criteria requirements as approved by Architect/Owner's Representative before BID. See Section 01 6200.
- b. Silane Based Sealers:
 - 1) MasterProtect H 1000 by BASF, Cleveland, OH www.master-builders-solutions.basf.us.
 - a) Low VOC.
 - 2) Weather Worker J29A by Dayton Superior Corporation, Miamisburg, OH www.daytonsuperior.com.
 - 3) Baracade Silane 100 by Euclid, Cleveland, OH www.euclidchemical.com.
 - a) Low VOC.
 - 4) Sikagard 705L by Sika Corporation, Lyndhurst, NJ www.usa.sika.com.
 - a) Low VOC.
 - 5) TK-590-100 by TK Products, Minnetonka, MN www.tkproducts.com.
 - 6) Equal product meeting design criteria requirements as approved by Architect/Owner's Representative before BID. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification Of Conditions:
 1. Verify concrete has properly cured.

3.2 PREPARATION

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

3.3 PREPARATION

- A. Protection Of In-Place Conditions:
 1. Sterilant/Concrete Sealer:
 - a. Take necessary precautions to protect adjoining property and areas designated for planting on building site. Use drop cloths or masking as required.
 - b. Do not contaminate any body of water by direct application, cleaning of equipment or disposal of wastes.
- B. Surface Preparation:
 1. Grease or Oil Patches:
 - a. Remove grease or oil patches, and spillage of any material that has adhered to concrete surface.
 2. Cracks, Control Joints and Expansion Joints:
 - a. Remove weed and other live vegetation matter from concrete cracks (if any) and joints:
 - 1) Remove with wire wheel on crack cleaner/edger.
 - b. Repair concrete cracks and joints if required using sealant as specified in Section 07 9213.
 3. Cleaning:

- a. Clean concrete surface of all dirt, mud spots, silt spots, loose material, vegetation, oil spots, and other objectionable and foreign material.
 - b. Remove debris, sand, dirt, and dust from concrete surface.
 - c. Power brooms, power blowers, air compressors, water flushing equipment, and blowers are acceptable equipment for cleaning concrete surface.
 - d. Concrete surface is to be dry, clean and sound.
4. Inspect concrete surface. Repeat any steps if necessary.

3.4 APPLICATION

- A. Sterilant:
 1. Apply Sterilant to concrete cracks and joints where weeds and live vegetation was removed.
 2. Follow Manufacturer's printed application requirements.
 3. Apply to concrete cracks and joints dispersed in liquid. Concentrate shall be such that Manufacturer's full recommended amount of chemical will be applied.
- B. Concrete Sealer:
 1. General:
 - a. Apply concrete sealer after surface preparation has been completed as per Manufacturer's recommendations.
 - b. Follow Manufacturer's ambient conditions for minimum and maximum application temperatures and application precautions when rain is expected.
 - c. Stir material thoroughly before and during application if required by Manufacturer.
 - d. Do not apply sealer if standing water is visible on concrete surface to be treated.
 - e. Apply even distribution of sealer.
 - f. Do NOT over apply. All product should penetrate substrate with no surface build-up. Any excess or puddles of material must be removed.
 2. Apply Concrete Sealer:
 - a. Linseed Oil/Mineral Spirits Sealers:
 - 1) For maximum protection, apply onto concrete surface before it is exposed to deicing salts.
 - 2) Do not apply in temperatures below 40 deg F (4.4 deg C).
 - 3) Apply first coat at 1 gallon (3.785 liters) per 350 sq ft (32.5 sq m).
 - 4) When first coat is dry to touch, apply second coat at 1 gallon (3.785 liters) per 600 sq ft (55.7 sq m).
 - 5) When second coat is totally dry, surface is ready for traffic.
 - 6) Texture and absorption of surface will influence final coverage rates.
 - 7) This application will turn concrete to dark amber color.
 - b. Silane Based Sealers:
 - 1) Apply at rate of about 1 gallon (3.785 liters) per 300 sq ft (27.8 sq meters) or as per Manufacturer's recommendations depending upon absorbency of concrete surface.
 3. Allow Concrete Sealer to dry as per Manufacturer's recommendations.

3.5 CLEANING

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

END OF SECTION

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

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

1.2 REFERENCES

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

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

1. Follow Manufacturer's written instructions for handling and storage of product:
 - a. Store in unopened containers in clean, dry area between 35 deg F (2 deg C) and 110 deg F (43 deg C) (Keep from freezing) or as directed by Manufacturer's instruction.
2. Shelf Life: Do not use curing compound that is over one (1) year from manufacturer date.

1.6 FIELD CONDITIONS

A. Ambient Conditions:

1. Do not apply curing compound when temperature of concrete is less than 40 deg F (4.4 deg C).

PART 2 - PRODUCTS

2.1 MATERIALS

A. Membrane Concrete Curing:

1. Description:
 - a. Clear water-based, ready-to use membrane curing agent that cures freshly placed concrete, forming effective barrier against moisture loss from concrete surface.
2. Design Criteria:
 - a. Exterior Concrete:
 - 1) Dissipating or non-dissipating membrane curing agent.
 - b. Interior Concrete:
 - 1) Dissipating membrane curing agent only.
 - c. VOC-compliant compound.
 - d. Meet requirements of ASTM C309 and AASHTO M 148, Type 1 or 1-D, Class B.
 - e. Interior concrete: containing no mineral spirits, naphtha, or other components detrimental to finish flooring installation.
 - f. Maintain ninety-five (95) percent of mix water present in concrete mass after application.
 - g. Gradually dissipate after twenty-eight (28) days without leaving stain or discoloring concrete surface.
3. Horizontal and Vertical Cast-In-Place Structural Concrete:
 - a. Type One Acceptable Products.
 - 1) Exterior Concrete:
 - a) Clear Cure J7WB by Dayton Superior Corporation, Miamisburg, OH www.daytonsuperior.com.
 - b) Clear Water Resin by Right Point, Dekalb, IL www.rightpointe.com.
 - c) L&M Cure R by L&M Construction Chemicals, Inc. Omaha, NE www.lmcc.com.
 - d) VOCOMP 20 (do not use when concrete sealer will be applied in areas of freeze/thaw and deicer salts) by W.R. Meadows, Inc. Hampshire, IL www.wrmeadows.com.
 - e) 1100-Clear by W. R. Meadows, Inc. Hampshire, IL www.wrmeadows.com.
 - 2) Interior Concrete:
 - a) Clear Cure J7WB by Dayton Superior Corporation, Miamisburg, OH www.daytonsuperior.com.
 - b) Clear Water Resin by Right Point, Dekalb, IL www.rightpointe.com.
 - c) L&M Cure R by L&M Construction Chemicals, Inc. Omaha, NE www.lmcc.com.
 - d) 1100-Clear by W. R. Meadows, Inc. Hampshire, IL www.wrmeadows.com.
 - b. Equal product meeting design criteria requirements as approved by Architect/Owner's Representative before BID. See Section 01 6200.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 03 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 waterproofing pipe connections.

1.2 REFERENCES

- A. Association Publications:
1. American Concrete Institute:
 - a. ACI 305R-10, 'Guide to Hot Weather Concreting'.
 - b. ACI 306R-10, 'Guide to Cold Weather Concreting'.
 - c. ACI 351.1R-12, 'Grouting Between Foundations and Bases for Support of Equipment and Machinery'.
- B. Reference Standards:
1. ASTM International:
 - a. ASTM C1107/C1107M-17, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).'
 2. United States Army Corps of Engineers (USACE):
 - a. CRD C-621-93, 'Handbook for Concrete and Cement Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink)'.

1.3 SUBMITTALS

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

1.4 DELIVERY, STORAGE AND HANDLING

- A. Delivery And Acceptance Requirements:
1. Materials shall be delivered in original, unopened packages with labels intact clearly identifying product name and manufacturer until time of use.
- B. Storage And Handling Requirements:
1. Follow Manufacturer's recommendations including but not limited to following:
 - a. Store in clean, dry location.
 - b. Keep containers sealed until ready for use.
 - c. Store materials at room temperature before use.
 2. Protect materials during handling and placement to prevent damage or contamination.
 - a. Protect materials from freezing or overheating.
 3. Shelf Life: One (1) year minimum in original, unopened containers.

1.5 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Design Criteria:
1. Description:
 - a. Commercial non-shrink, non-metallic grout.
 2. Meet following requirements:
 - a. ASTM C1107/C1107M, Type B or Type C.
 - b. Corps and Engineers CRD C-621.
 - c. Compressive strength of **6000 psi (41 MPa)** minimum.
- B. Type Two Acceptable Products:
1. Masterflow 928 by BASF Systems, Shakopee, MN or BASF Canada, Mississauga, ON www.buildingsystems.basf.com.
 2. ProSpec F77 by Bonsal American, Inc., Charlotte, NC www.bonsal.com.
 3. Advantage 1107 Grout by Dayton Superior Corporation, Oregon, IL www.daytonsuperiorchemical.com.
 4. NS Grout by Euclid Chemical Company, Cleveland, OH www.euclidchemical.com.
 5. Five Star Grout by Five Star Products Inc, Fairfield, CT www.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

DIVISION 07: THERMAL AND MOISTURE PROTECTION

07 1000 DAMPPROOFING AND WATERPROOFING

07 1416 COLD FLUID-APPLIED WATERPROOFING

07 9000 JOINT PROTECTION

07 9213 ELASTOMERIC JOINT SEALANTS

END OF TABLE OF CONTENTS

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SECTION 07 1416**COLD FLUID-APPLIED WATERPROOFING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install fluid applied waterproofing system as described in Contract Documents including:
 - a. Prefabricated drainage composite.
 - b. Protection board.
- B. Related Requirements:
 - 1. Section 03 3111: 'Cast-In-Place Structural Concrete'.
 - 2. Section 07 9213: 'Elastomeric Joint Sealants'.

1.2 REFERENCES

- A. Reference Standards:
 - 1. ASTM International:
 - a. ASTM C836/C836M-18, 'Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course'.
 - b. ASTM C898/C898M-09(2017), 'Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane With Separate Wearing Course'.
 - c. ASTM D412-16, 'Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension'.
 - d. ASTM D903-98(2017), 'Standard Test Method for Peel or Stripping Strength of Adhesive Bonds'.
 - e. ASTM D1644-01(2017), 'Standard Test Methods for Nonvolatile Content of Varnishes'.
 - f. ASTM D1970/D1970M-18, 'Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection'.
 - g. ASTM D3767-03(2014), 'Standard Practice for Rubber—Measurement of Dimensions'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
 - 1. Participate in MANDATORY pre-installation conference. Following are required to be in attendance:
 - a. Installer's Foreman and those responsible for installation of sheet membrane.
 - b. Manufacturer's Representative.
 - c. Architect.
 - 2. Schedule pre-installation conference before installation of membrane.
 - 3. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review installation scheduling, coordination, and placement of membrane with adjacent work.
 - b. Review special details and flashing.
 - c. Review delivery, storage, and handling requirements.
 - d. Review cold and hot weather requirements.
 - e. Review cleaning, protection, and disposal requirements.

1.4 SUBMITTALS

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

- a. Provide Manufacturer's product data, installation instructions, use limitations and recommendations. Include certification of data indicating VOC (Volatile Organic Compound) content of all components of waterproofing system.
 2. Samples: Submit representative samples of following for approval:
 - a. Sheet membrane.
 - b. Protection board.
 - c. Prefabricated drainage composite.
- B. Informational Submittals:
1. Qualification Statements:
 - a. Manufacturer's qualification documentation for approval by Architect.
 - b. Installer's qualification documentation for approval by Architect before commencing Work.
- C. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Warranty Documentation:
 - 1) Final, executed copy of Warranty.

1.5 QUALITY ASSURANCE

- A. Qualifications. Requirements of Section 01 4301 applies, but not limited to following:
1. Manufacturer:
 - a. Sheet Membrane Manufacturer with minimum of twenty (20) years of experience in production of self adhesive sheet membrane waterproofing.
 - b. Provide list of projects of completed installations of comparable quality, scope, similar size, and complexity in past five (5) years before bidding.
 - c. Submit evidence of ability to meet all requirements specified in this specification.
 2. Installer:
 - a. Minimum of three (3) years experience on successfully completed projects of similar nature.
 - b. Minimum three (3) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.
 - c. Submit documentation.
 3. Materials:
 - a. For each type of material required for the work of this section, provide primary materials which are products of one manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
1. Make no deliveries to Project until installation is about to commence, or until approved storage area is provided.
 2. Deliver products job site in original unopened containers or wrappings bearing all seals and approvals.
 3. Deliver materials in sufficient quantities to allow continuity of work.
- B. Storage And Handling Requirements:
1. Storage Requirements:
 - a. General:
 - 1) Store and handle material in compliance with Manufacturer's instructions, recommendations and material safety data sheets.
 - 2) Protect materials from physical damage, weather, sunlight, excessive temperatures and construction operations in a protected location.
 - 3) Remove damaged material from site and dispose of in accordance with applicable regulations at no additional cost to Owner.
 - b. Membrane:
 - 1) Do not double-stack pallets.
 - 2) Provide cover on top and all sides, allowing for adequate ventilation.

- c. Mastic and Adhesive: Protect from moisture and potential sources of ignition.
- d. Drainage Composite or protection Board: Store off ground with cover on top and all sides.
- e. Surface Conditioner: Protect from freezing.

1.7 FIELD CONDITIONS

A. Ambient Conditions:

- 1. General:
 - a. Proceed with installation only when existing and forecasted weather conditions are within range of ambient and substrate temperatures recommended by manufacturer.
 - b. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing.

1.8 WARRANTY

A. Manufacturer Warranty:

- 1. Sheet Membrane Manufacturer's five (5) year material warranty upon completion of the Work.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Manufacturers:

- 1. Category Four Approved Products And Manufacturers. See Section 01 6200 for definitions of Categories:
 - a. Procor fluid applied membranes by Grace Construction Products, Cambridge, MA
www.na.graceconstruction.com.

B. Materials:

- 1. Sheet Membrane Waterproofing System:
 - a. Description:
 - 1) Self-adhesive, cold-applied composite sheet consisting of thickness of 0.056 inch (1.4 mm) of rubberized asphalt and 0.004 inch (0.1 mm) of cross-laminated, high density polyethylene film formulated for use with water-based surface conditioner.
 - 2) Provide rubberized asphalt membrane covered with release sheet which is removed during installation.
 - 3) No special adhesive or heat shall be required to form laps.
 - b. Design Criteria:
 - 1) Physical Properties:

Property	Test Method	Typical Value
Color		Terra Cotta
Cured Film Thickness	ASTM D3767 Method A	1.5 mm (0.060 in) nominal
Flexibility, 180° bend over 25 mm (1 in.) mandrel at -43°C (-45°F)	ASTM D1970/D1970M	Unaffected
Tensile Strength, Membrane Die C	ASTM D412 Modified ¹	2240 kPa (325 lbs/in. ²) min.
Tensile Strength, Film	ASTM D882 Modified ¹	34.5 MPa (5,000 lbs/in. ²) min.
Elongation, Ultimate Failure of Rubberized Asphalt	ASTM D412 Modified ¹	300 percent minimum

Crack Cycling at -32°C (-25°F), 100 Cycles	ASTM C836/C836M	Unaffected
Lap Adhesion at Minimum Application Temperature	ASTM D1876 Modified ²	880 N/m (5 lbs/in.)
Peel Strength	ASTM D903 Modified ³	1576 N/m (9 lbs/in.)
Puncture Resistance, Membrane	ASTM E154	222 N (50 lbs) minimum
Resistance to Hydrostatic Head	ASTM D5385	70 m (231 ft) of water
Permeance	ASTM E96/E96M, Section 12 – Water Method	2.9 ng/m ² sPa (0.05 perms) maximum
Water Absorption	ASTM D570	0.1% maximum

Footnotes:

- 1 The test is run at a rate of 50 mm (2 in.) per minute.
- 2 The test is conducted 15 minutes after the lap is formed and run at a rate of 50 mm (2 in.) per minute at -4°C (25°F).
- 3 The 180° peel strength is run at a rate of 300 mm (12 in.) per minute.

2. Prefabricated Drainage Composite:
 - a. General:
 - 1) Designed to promote positive drainage while serving as protection course.
 - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - 1) Hydroduct 660 Drainage Composite by Grace.
3. Protection Board:
 - a. Extruded polystyrene foam insulation.
 - 1) Design Criteria: Meet requirements as specified in Section 07 2113.
 - 2) Thickness: 25 mm (1 inch).
 - 3) Application: Adhere to waterproofing membrane with Bituthene Protection Board Adhesive.
 - b. Asphalt Hardboard:
 - 1) Description:
 - a) Premolded semi-rigid protection board consisting of bitumen, mineral core and reinforcement.
 - 2) Application:
 - a) Provide 3 mm (0.118 inch) thick hardboard on horizontal surfaces not receiving steel reinforced slab.
 - b) Where steel reinforcing bars are to be used, apply two layers of 3 mm (0.118 inch) thick hardboard or one layer of 6 mm (0.236 inch) thick hardboard.
4. Waterstop:
 - a. General:
 - 1) For non-moving concrete construction joints.
 - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - 1) Adcor™ ES hydrophilic non-bentonite waterstop by Grace.
5. Miscellaneous Materials:
 - a. Surface conditioner, mastic, liquid membrane, tape and accessories specified or acceptable to manufacturer of sheet membrane waterproofing.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verification Of Conditions:
 1. Examine condition of substrates and installed work of all other trades and verify that all such work is complete to point where installation may properly commence.

2. Note any circumstances or discrepancies detrimental to proper completion of the Work.
3. Notify Architect of unsuitable conditions in writing.
 - a. Commencement of Work by installer is considered acceptance of substrate.
 - b. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Substrates:
1. Follow Sheet Membrane Manufacturer's instructions for preparation of substrates including but not limited to following:
 - a. Surfaces shall be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions.
 - b. Remove contaminants such as grease, oil and wax from exposed surfaces.
 - c. Remove dust, dirt, loose stone and debris.
 - d. Use repair materials and methods which are acceptable to Sheet Membrane Manufacturer.
- B. Concrete:
1. Do not proceed with installation until concrete has properly cured and dried (seven (7) days minimum for normal structural concrete).
 2. Fill form tie rod holes with concrete and finish flush with surrounding surface.
 3. Repair bug holes over 13 mm (0.5 in.) in length and 6 mm (0.25 in.) deep and finish flush with surrounding surface.
 4. Remove scaling to sound, unaffected concrete and repair exposed area.
 5. Grind irregular construction joints to suitable flush surface.
- C. Related Materials:
1. Treat joints and install flashing as recommended by Sheet Membrane Manufacturer.

3.3 INSTALLATION

- A. General:
1. Follow Manufacturer's written installation instructions including but not limited to following:
 - a. Surface Conditioner:
 - 1) Apply surface conditioner at rate recommended by Manufacturer.
 - 2) Recoat areas not waterproofed if contaminated by dust.
 - 3) Mask and protect adjoining exposed finish surfaces to protect those surfaces from excessive application of surface conditioner.
 - 4) Delay application of membrane until surface conditioner is completely dry. Dry time will vary with weather conditions.
 - 5) Apply surface conditioner at rate recommended by Manufacturer.
 - b. Sealants:
 - 1) Seal daily terminations with troweled bead of mastic.
 - c. Protection Board And Related Materials:
 - 1) Apply in accordance with Manufacturer's recommendations.

3.4 CLEANING AND PROTECTION

- A. Remove any masking materials after installation. Clean any stains on materials which would be exposed in the completed work.
- B. Protect completed membrane waterproofing from subsequent construction activities as recommended by Manufacturer.

END OF SECTION

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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.
- C. Products Furnished But not Installed Under This Section:
 - 1. Interior Ceramic Tile Joint Sealants:
- D. Related Requirements:
 - 1. Section 09 3013: 'Ceramic Tiling'.

1.2 REFERENCES

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

- f) A (Aluminum): Sealant that meets bond requirements when tested on aluminum specimens.
 - g) O (Other): Sealant that meets bond requirements when tested on substrates other than standard substrates, being glass, aluminum, mortar.
2. Silicone: Any member of family of polymeric products whose molecular backbone is made up of alternating silicon and oxygen atoms and which has pendant hydrocarbon groups attached to silicon atoms. Used primarily as a sealant. Offers excellent resistance to water and large variations in temperature (minus 100 deg F to + 600 deg F) (minus 73.3 deg C to + 316 deg C).
- B. Reference Standards:
- 1. ASTM International:
 - a. ASTM C920-14a, 'Standard Specification for Elastomeric Joint Sealants'.
 - b. ASTM C1193-16, 'Standard Guide for Use of Joint Sealants'.
 - c. ASTM C1330-18, 'Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants'.
 - d. ASTM C1481-12(2017) 'Standard Guide for Use of Joint Sealants with Exterior Insulation & Finish Systems (EIFS)'.
 - e. ASTM D5893/D5893M-16, 'Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements'.

1.3 ADMINISTRATIVE REQUIREMENTS

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

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

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

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 FIELD CONDITIONS

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

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 SYSTEMS

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

- d. Laticrete International Inc., Bethany, CT www.laticrete.com.
 - e. Momentive Performance Materials Inc. (formally GE Sealants & Adhesives), Huntersville, NC www.ge.com/silicones.
 - f. Sherwin-Williams, Cleveland, OH www.sherwin-williams.com.
 - g. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com or Sika Canada Inc, Pointe Claire, QC www.sika.ca.
 - h. Tremco, Beachwood, OH www.tremcosealants.com or Tremco Ltd, Toronto, ON (800) 363-3213.
- B. Materials:
1. Design Criteria:
 - a. Compliance: Meet or exceed requirements of these standards:
 - 1) ASTM C920: Elastomeric joint sealant performance standard.
 - 2) ASTM D5893/D5893M: Silicone Joint Sealant for Concrete Pavements.
 - b. Comply with Manufacturer's ambient condition requirements.
 - c. Sealants must meet Manufacturer's shelf-life requirements.
 - d. Sealants must adhere to and be compatible with specified substrates.
 - e. Sealants shall be stable when exposed to UV, joint movements, and environment prevailing at project location.
 - f. Primers (Concrete, stone, masonry, and other nonporous surfaces typically do not require a primer. Aluminum and other nonporous surfaces except glass require use of a primer. Installer Option to use Adhesion Test to determine if primer is required or use primer called out in related sections):
 - 1) Adhesion Test:
 - a) Apply silicone sealant to small area and perform adhesion test to determine if primer is required to achieve adequate adhesion. If necessary, apply primer at rate and in accordance with Manufacturer's instructions. See 'Field Quality Control' in Part 3 of this specification for Adhesive Test.
 - 2) If Primer required, shall not stain and shall be compatible with substrates.
 - 3) Allow primer to dry before applying sealant.
 2. Sealants At Exterior Building Elements:
 - a. Description:
 - 1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
 - a) Aluminum entrance perimeters and thresholds.
 - b) Columns.
 - c) Connections.
 - d) Curtainwalls.
 - e) Door frames.
 - f) EIFS to metal joints.
 - g) Joints and cracks around windows.
 - h) Louvers.
 - i) Masonry.
 - j) Parapet caps.
 - k) Wall penetrations.
 - l) Other joints necessary to seal off building from outside air and moisture.
 - b. Design Criteria:
 - 1) Meet following standards for Sealant:
 - a) ASTM C920: Type S, Grade NS, Class 50 Use NT, M, G, A.
 - 2) Limitations:
 - a) Do not use below-grade applications.
 - b) Do not use on surfaces that are continuously immersed or in contact with water.
 - c) Do not use on wet, damp, frozen or contaminated surfaces.
 - d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
 - 3) Color:
 - a) Architect to select from Manufacturer's standard colors.
 - b) Match building elements instead of window (do not use white that shows dirt easily).
 - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

- 1) Dow Corning:
 - a) Primer: 1200 Prime Coat.
 - b) Sealant: 791 Silicone Weatherproofing Sealant.
- 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
 - a) Primer: SS4044 Primer.
 - b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.
- 3) Tremco:
 - a) Primer:
 - (1) Metal surface: No. 20 primer.
 - (2) Porous surfaces: No. 23 primer.
 - b) Sealant: Spectrum 1 Silicone Sealant.
3. Sealants At Expansion Joints in Exterior Concrete (Aprons, Entryway Slabs, Mowstrips, Retaining Walls, Sidewalks):
 - a. Expansion Joints:
 - 1) Design Criteria:
 - a) Meet following standards for Sealant:
 - (1) ASTM C920: Type S, Grade NS, Class 100/50 Use T, NT, M, G, A, and O.
 - 2) Sealant required at expansion for following areas:
 - a) Between entryway slabs and building foundations.
 - b) Between sidewalks and building foundations.
 - c) Miscellaneous vertical applications.
 - 3) Sealant NOT required at expansion joints for following areas:
 - a) Within aprons and where aprons abut building foundations and sidewalks.
 - b) Within mowstrips and where mowstrips abut building foundations and sidewalks.
 - c) Within sidewalks.
 - 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 790 Silicone Building Sealant.
 - b) Sika:
 - (1) Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
 - b. Penetrations thru Concrete Walls:
 - 1) Design Criteria:
 - a) Meet following standards for Sealant:
 - (1) ASTM C920: Type S, Grade NS, Class 100/50 Use T, NT, M, G, A, and O.
 - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 790 Silicone Building Sealant.
 - b) Sika:
 - (1) Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 NS Non-Sag Silicone Sealant.
4. Sealants At Control Joints in Exterior Concrete (Aprons, Entryway Slabs, Mowstrips, Retaining Walls, Sidewalks):
 - a. Control Joints:
 - 1) Design Criteria:
 - a) Meet following standards for Sealant:
 - (1) ASTM C920, Type S, Grade P, Class 100/50; Use T, M, G, A, O.
 - 2) Sealant required at control joints in following areas:
 - a) Retaining walls.
 - b) Miscellaneous vertical applications.
 - 3) Sealant is NOT required at control joints, unless needed to protect moisture sensitive soils or by Contract Drawings, in following areas:
 - a) Within aprons.
 - b) Within mowstrips.

- c) Within sidewalks.
- d) Within entryway slabs.
- 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 890-SL Silicone Building Sealant.
 - b) Sika:
 - (1) Primer: Primer: Sikasil Primer-2100.
 - (2) Sealant: Sikasil-728 SL Self-leveling Silicone Sealant.
- 5. Sealants At Curbs And Gutters:
 - a. Expansion Joints and Control Joints:
 - 1) Description:
 - a) Effective for sealing transverse contraction and expansion joints, longitudinal, center line and shoulder joints in Portland cement concrete.
 - b) One component (part) non-sag silicone material that cures to low modulus, silicone rubber upon exposure to atmospheric moisture. May be applied over wide temperature range.
 - 2) Design Criteria:
 - a) Expansion joint sealant is required in following areas:
 - (1) Within curbs and gutters at approved layout locations.
 - b) Meet following standards for Sealant: Non-sag: ASTM C920: Type S, Grade NS, Class 100/50, Use T, NT.
 - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Dow Corning:
 - (1) Primer: 1200 Prime Coat.
 - (2) Sealant: 888 Silicone Joint Sealant.
 - b) Sika:
 - (1) Primer: Primer: Sikasil Primer-2100.
 - (2) Sikasil-728 NS Non-Sag Silicone Sealant.
- 6. Sealants For Interior Joints:
 - a. Interior Ceramic Tile Joints are furnished in Section 07 9213 and installed in Section 09 3013 'Ceramic Tiling' including the following:
 - 1) Ceramic tile inside corners.
 - 2) Ceramic tile and paver tile joints.
 - b. Description:
 - 1) One-part acetoxy cure silicone sealant with fungicides to resist mold and mildew.
 - c. Design Criteria:
 - 1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.
 - 2) 100 percent silicone sealant.
 - d. Color: As selected by Architect from Manufacturer's standard colors.
 - e. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - 1) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
 - 2) Laticrete: Latasil Tile and Stone Silicone Sealant.
 - 3) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS1700 Sanitary Silicone Sealant.
 - 4) Tremco: Tremsil 200 Silicone Sealant.

2.2 ACCESSORIES

- A. Bond Breaker Tape:
 - 1. Pressure sensitive tape as by Sealant Manufacturer to suit application.
 - 2. Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.
- B. Joint Backing:
 - 1. Comply with ASTM C1330.

2. Flexible closed cell, non-gassing polyurethane or polyolefin rod or bond breaker tape as recommended by Sealant Manufacturer for joints being sealed.
 3. Oversized 25 to 50 percent larger than joint width.
- C. Joint Cleaner:
1. Non-corrosive and non-staining type as recommended by Sealant Manufacturer, compatible with joint forming materials.
- D. Masking Tape:
1. Non-staining, non-absorbent 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. 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, frost or incompatible sealers, paints or coatings that may interfere with adhesion. Prepare substrates in accordance with Manufacturer's instructions:
 - a. Porous surfaces: Clean by mechanical methods to expose sound surface free of contamination and laitance followed by blasting with oil-free compressed air.
 - b. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193. Allow solvent to evaporate prior to sealant application.
 - c. High-pressure water cleaning: Exercise care that water does not enter through failed joints.
 - d. Primers:
 - 1) Primers enhance adhesion ability.
 - 2) Use of primers is not a substitution for poor joint preparation.
 - 3) Primers should be used always in horizontal application where there is ponding water.
 3. Field test joints in inconspicuous location.
 - a. Verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.
 - b. When test indicates sealant adhesion failure, modify joint preparation primer, or both and retest until joint passes sealant adhesion test.
 4. Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.
- B. Joints:
1. Prepare joints in accordance with ASTM C1193.

- a. Clean joint surfaces of contaminants capable of affecting sealant bond to joint surface using Manufacturer's recommended instructions for joint preparation methods.
 - b. Remove dirt, dust, oils, wax, paints, and contamination capable of affecting primer and sealant bond.
 - c. Clean concrete joint surfaces to remove curing agents and form release agents.
- C. Protection:
1. Protect elements surrounding the Work of this section from damage or disfiguration.

3.3 APPLICATION

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

3.4 TOLERANCES

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

3.5 FIELD QUALITY CONTROL

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

3.6 CLEANING

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

END OF SECTION

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DIVISION 09: FINISHES

09 0500 COMMON WORK RESULTS FOR FINISHES

09 0503 FLOORING SUBSTRATE PREPARATION

09 3000 TILING

09 3013 CERAMIC TILING

09 6000 FLOORING

09 6466 WOOD ATHLETIC FLOORING

09 9000 PAINTS AND COATINGS

09 9001 COMMON PAINTING AND COATING REQUIREMENTS

09 9125 INTERIOR PAINTED WOOD

09 9324 INTERIOR CLEAR-FINISHED HARDWOOD

END OF TABLE OF CONTENTS

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SECTION 09 0503**FLOORING SUBSTRATE PREPARATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Coordination and scheduling of Owner Furnished Field Testing for Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) of concrete slab before flooring installation (except carpet) as described in Contract Documents.
 2. Preparing floor substrate to receive flooring as described in Contract Documents.
 3. Perform building modifications and repairs to accommodate carpet and carpet base as described in Contract Documents.
- B. Related Requirements:
1. Pre-Installation conferences held jointly with Section 09 0503 as described in Administrative Requirements on Part 1 of this specification section.
 2. Section 01 1200: 'Multiple Contract Summary' for Owner Testing for Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) of concrete before installation of flooring.
 3. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 4. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation tolerances for concrete slabs.
 5. Section 09 6466: 'Wood Athletic Flooring'.

1.2 REFERENCES

- A. Association Publications:
1. International Concrete Repair Institute: '*ICRI Concrete Slab Moisture Testing Program*' Rosemont, IL www.icri.org.
 - a. ICRI Certification: 'Concrete Slab Moisture Testing Technician, Tier 2, Grade 1'.
- B. Reference Standards:
1. ASTM International:
 - a. ASTM F710-17, 'Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring'.
 - b. ASTM F1869-16a, 'Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride'.
 - c. ASTM F2170-18, 'Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
1. Participate in MANDATORY pre-installation conference held jointly if possible for all related Division 09 6000 'Flooring' used for Project.
 2. Schedule conference after substrate preparation and before installation of flooring system. (If more than one (1) flooring system is included for project, hold conference at same time if schedule permits).
 3. Conference may be held at project site or another convenient site. Participants may also attend by video or audio conference if approved by Project Manager.
 4. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review condition of floor with regards to compliance with concrete installation tolerances and other work necessary to prepare floors for installation of flooring.
 - b. Review Testing Agency testing report of Concrete Moisture of concrete:

- 1) Installer may verify Concrete Moisture of concrete.
 5. Review condition of floor regarding compliance with concrete installation tolerances and other work necessary to prepare floors for installation of flooring.
 6. Review additional agenda items all related flooring sections.
- B. Scheduling:
1. Concrete Moisture Testing:
 - a. General Contractor Responsibility to provide:
 - 1) Maintain ambient temperatures and relative humidity conditions as specified in Field Conditions in Part 1 of this specification before Moisture Testing Agency will test for concrete moisture.
 - 2) Notify Owner to contact Moisture Testing Agency when building is enclosed and temperature and relative humidity meet requirements for testing.
 - 3) Provide access for and cooperate with Moisture Testing Agency.
 - b. Owner's Representative Responsibility to provide:
 - 1) Provide following information to Moisture Testing Agency at time of notification:
 - a) Digital copy of floor plan(s).
 - b) Indicate different flooring material areas and which rooms on floor plan(s) and finish schedule requiring additional tests if required.
 - c) Digital copy of Specification Section 09 0503 (this specification) and Section 01 4523 'Testing And Inspecting Services' from Contract Documents for this Project.
 - 2) Carpet Flooring:
 - a) Carpet Installer at his/her discretion may test concrete slab for Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) before installation of Owner Furnished carpet.
 - b) If carpet area is tested, Installer to coordinate with Owner's Representative for following:
 - (1) Scheduling and coordination for maintain ambient temperatures and relative humidity conditions required before Moisture Testing of concrete moisture.
 - (2) Access to Building for concrete moisture testing.
 - c. Testing Agency will provide Moisture Testing for following flooring areas:
 - 1) Wood Athletic Flooring:
 - a) Moisture Testing for Wood Athletic Flooring required.
 - b) Moisture Testing and Testing Report requirements specified in Informational Submittals.
 - c) See individual flooring section for additional scheduling requirements if required.

1.4 SUBMITTALS

- A. Informational Submittals:
1. Certificates:
 - a. Concrete Slab Moisture Technician:
 - 1) Provide current ICRI 'Concrete Slab Moisture Testing Technician, Tier 2, Grade 1' Certification.
 - b. Certified Standard Moisture Testing Report:
 - 1) Report to include following:
 - a) Available to Testing Agency from Owner's Representative:
 - (1) Project Name.
 - (2) Property Number.
 - b) Test date.
 - c) Executive summary.
 - d) Certified Moisture and Alkalinity (pH) Test Report.
 - e) Project floor plan.
 - f) Project photographs including following information on each photograph:
 - (1) Site location.
 - (2) Test hole number.
 - (3) Serial number probe.
 - (4) Relative Humidity (RH), Alkalinity (pH) and temperature reading.
 - (5) Property number.
 - g) Outlier Test (As specified in Field Quality Control Testing in Part 3 of this specification:

- (1) Note test as Outlier Test for which hole number was conducted.
 - (2) Site location.
 - (3) Test hole number.
 - (4) Serial number probe.
 - (5) Relative Humidity (RH), Alkalinity (pH) and temperature reading.
 - (6) Property number.
 - 2) At completion of testing, Testing Agency shall submit Concrete Moisture Test Report for each flooring system included for project to following:
 - a) One (1) copy to Owner's Representative.
- c. Certified Comprehensive Moisture Testing Report:
 - 1) Report to include following:
 - a) Available to Testing Agency from Owner's Representative:
 - (1) Project Name.
 - (2) Property Number.
 - b) Test date.
 - c) Executive summary.
 - d) Certified Moisture and Alkalinity (pH) Test Report.
 - e) Project floor plan.
 - f) Test results mapping diagrams.
 - g) Project photographs including following information on each photograph:
 - (1) Site location.
 - (2) Test hole number.
 - (3) Serial number probe.
 - (4) Relative Humidity (RH), Calcium Chloride (CaCl₂), Alkalinity (pH) and temperature reading.
 - (5) Property number.
 - 2) At completion of testing, Testing Agency shall submit Concrete Moisture Test Report for each flooring system included for project to following:
 - a) One (1) copy to Owner's Representative.

2. Special Procedure Submittals:

a. 'Concrete Moisture Testing Request and Proposal':

- 1) Provided by Owner's Representative for each project to Testing Agency:
 - a) Testing Agency to fill out form with following information and return as instructed:
 - (1) Review request information.
 - (2) Add information as requested.
 - (3) Sign form.
 - (4) E-mail form back to Owner's Representative.

b. Certified Moisture Testing Report Distribution:

- 1) Owner's Representative responsibilities after receiving Concrete Moisture Test Report:
 - a) Provide copies to following:
 - (1) One (1) copy to Architect.
 - (2) One (1) copy to Contractor.
- 2) General Contractor responsibilities after receiving Concrete Moisture Test Report from Owner's Representative:
 - a) Provide copies to following:
 - (1) One (1) copy to Resilient Tile Flooring Manufacturer.
 - (2) One (1) copy to Synthetic Athletic Flooring Manufacturer.
 - (3) One (1) copy to Wood Athletic Flooring Manufacturer.

c. Moisture Testing Report Instructions:

- 1) Wood Athletic Flooring area testing for Alkalinity and Concrete Slab Moisture by Testing Agency Testing:
 - a) If Testing Agency Testing Results are eighty-five (85) percent RH or more as recommended by MFMA and/or pH level 9 or higher:
 - (1) Remediation to be discussed with Owner's Representative and Athletic Wood Flooring Manufacturer. For questions, contact Church Headquarters Wood Athletic Flooring Contract Manager in Purchasing at flammjd@ldschurch.org before proceeding with installation.

B. Qualification Statement:

1. Concrete Slab Moisture Technician:
 - a. 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) Testing and Inspection Reports:
 - a) Testing Agency Testing Reports of Alkalinity and Concrete Moisture testing.

1.5 QUALITY ASSURANCE

- A. Testing and Inspection.
 1. Owner will provide Field Testing for Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) of concrete slab before flooring (except carpet) installation as specified in Field Quality Control in Part 3 of this specifications:
 - a. See Section 01 1200: 'Multiple Contract Summary'.
 - b. See Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 2. Type One Acceptable Testing Agency:
 - a. See 'Agreement Between Owner And Testing Agency For Testing And Inspection Services (U.S.)' or 'Agreement Between Owner And Testing Agency For Testing And Inspection Services (Canada)'.
 - 1) Equal as approved by Architect or Owner's Representative before bidding. See Section 01 6200.
 - b. Existing Projects.
 - 1) Flooring projects do not need to use Agreement Between Owner And Testing Agency listed in previous paragraph but Owner Testing Agency must:
 - a) Meet Testing Agency Testing requirements of this specifications including 'Concrete Slab Moisture Technician' Qualifications.
- B. Qualifications.
 1. Concrete Slab Moisture Technician:
 - a. ICRI 'Concrete Slab Moisture Testing Technician, Tier 2, Grade 1' Certification:
 - 1) Certification includes three (3) hour education session, written exam, and field testing performance exam based on ASTM standards.
 - 2) Certification valid for period of five (5) years from date of testing completion.
 - b. Provide documentation if requested by Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
 1. Provide storage space and protection for flooring and installation accessories if materials are delivered before start of flooring installation.

1.7 FIELD CONDITIONS

- A. Ambient Conditions:
 1. Testing conditions inside building shall be brought to same ambient temperature and relative humidity levels to be normal at occupancy of building (service conditions). Service conditions include normal levels of humidity, lighting, heating, and air conditioning:
 - a. If service conditions are not possible, test conditions shall be **75 deg F (23.9 deg C) ± 10 deg F (minus 12.2 deg C)** maintain relative humidity between forty (40) and sixty (60) percent in spaces to receive testing.

2. Maintain these conditions forty-eight (48) hours prior to, and during testing. Otherwise, results may not accurately reflect amount of moisture which is present in concrete slab or would normally be emitted from or through concrete slab during normal operating conditions.
- B. Existing Conditions:
1. If asbestos containing materials are suspected or discovered upon removing carpet, stop work and report to Architect and Owner's Representative before proceeding:
 - a. Do not use solvents to wash substrate during abatement process.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION

3.1 PREPARATION

A. Flooring Preparation:

1. General:
 - a. Prepare floor substrate in accordance with ASTM F710, 'Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring' (This standard is used for preparing concrete floors for all flooring).
 - 1) Required RH test and alkalinity test of concrete slab has been performed.
 - b. Concrete floor slab patching:
 - 1) Cracks, chips and joints must be properly patched or repaired.
 - c. Concrete surface cured, clean, dry, and free of dirt, dust, grease, wax, and other foreign substances that will compromise flooring installations.
 - 1) Removal of curing compounds.
 - 2) Remove paint, sealer, grease, oil, silicone sealants, and other materials incompatible with flooring adhesives.
 - 3) Removal of overspray from painted walls (essential so glue will stick).
 - d. Vacuum and damp mop floor areas to receive flooring before flooring installation.

B. Carpet Accessories:

1. Sundry items, such as adhesives, shall be conditioned to building ambient conditions before use.

3.2 FIELD QUALITY CONTROL

A. Field Tests:

1. General:
 - a. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - b. Quality Control is sole responsibility of Contractor as specified in Section 01 4523 'Testing And Inspection Services'.
2. Concrete Moisture and Alkalinity:
 - a. Testing Agency will test interior concrete slabs before installation of floor coverings as directed by Architect and will include following:
 - 1) Interior concrete slab areas to be tested:
 - a) Section 09 6466 'Wood Athletic Flooring'.
 - 2) Standard Moisture Testing required of interior concrete slabs on grade:
 - a) General:
 - (1) Testing for concrete moisture shall be taken at concrete slab substrates scheduled to receive flooring as specified in Contract Drawings for complete flooring installation.
 - (2) Outlier Test: If one (1) test is abnormally different from other moisture tests, then additional test should be done. Outlier will be defined in this specification as

- moisture test that is at least fifteen (15) percent higher or lower than other tests at project building completed same day:
- (a) Retesting should be done within 5 feet (1.50 m) feet of original test hole.
 - (b) Contact Owner's Representative for the need to outlier test and additional testing fees will apply.
- (3) Include required tests for carpeting and additional tests at each different type of flooring system included for project.
- b) Existing Meetinghouse:
- (1) General:
 - (a) Testing for concrete moisture should be evaluated from project to project for size of project and where floor coverings will be installed.
 - (2) Test sites required where floor coverings will be installed. Provide tests at each different type of flooring system included for project.
 - (a) Three (3) minimum tests in wood athletic flooring area.
 - (b) Provide additional testing as directed by Architect if necessary.
 - c) Comprehensive Moisture Testing: Test for moisture in concrete slab when known moisture problems exist such as high-water table, distressed floor covering, or when RH testing alone does not provide adequate understanding of concrete slab moisture conditions that may adversely affect flooring material:
 - (1) Contact Owner's Representative before conducting additional testing stating why need for addition testing and to approve additional fees to testing.
 - (2) Perform Comprehensive Moisture Testing where floor coverings will be installed including following tests:
 - (a) Calcium Chloride Testing referencing ASTM F1869.
 - (b) Relative Humidity In-Situ Probe Testing referencing ASTM F2170.
 - (3) Number of tests to be determined by Testing Agency.
- b. Approved Concrete Moisture Tests:
- 1) Concrete Moisture Test (test used with Standard Moisture and Comprehensive Moisture Testing if included for project). See Section 01 6200:
 - a) Relative Humidity (RH) testing using in-situ probes in accordance with ASTM F2170 testing requirements:
 - (1) Check calibration of measuring instrument.
 - (2) Building ambient conditions are met before testing.
 - (3) Drill Hole:
 - (a) Drill and prepare test holes as per ASTM F2170 (correct hole-depth and hole diameter are required).
 - (b) Drill holes equal to forty (40) percent of slab's thickness for concrete slabs on grade and twenty (20) percent of slab's thickness for suspended concrete slabs (hole must be perpendicular (90 deg) to surface).
 - (4) Clean Hole:
 - (a) Follow Manufacturer's installation instructions for cleaning holes and inserting sensor.
 - (5) Insert Sensor:
 - (a) Follow Manufacturer's installation instructions for inserting sensor.
 - (6) Readings:
 - (a) Follow Manufacturer's installation instructions for taking readings.
 - (b) Two (2) hours after installation of sensor, RH reading will be recorded. (Two (2) hour read is in lieu of the seventy-two (72) hour ASTM standard)
 - (7) Future Testing:
 - (a) For future readings, replace protective cap by snapping it back into sensor.
 - (8) Test Report shall be submitted as specified in Informational Submittals in Part 1 of this specification.
 - (a) For future readings, replace protective cap by snapping it back into sensor.
 - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Concrete moisture testing meter:
 - (a) Rapid RH 4.0 EX with Touch-n-Sense Technology and Rapid RH EX Smart Sensors by Wagner Meters, Rogue River, OR www.wagnermeters.com.
 - 2) Calcium Chloride Vapor Emission CaCl₂ Moisture Vapor Emission Test (MVER) (test used only with Comprehensive Moisture Testing):

- a) Surface (MVER) testing shall be performed in accordance with ASTM F1869:
 - (1) Anhydrous Calcium Chloride (CaCl₂) Moisture Vapor Emission Test requires 60 to 72 hours to complete.
 - (2) Remove floor coverings or coatings, if present.
 - (3) Prior to placement of anhydrous calcium chloride tests, actual test area shall be clean and free of all foreign substances.
 - (4) At start of testing, weigh dish of anhydrous calcium chloride, including tape used to seal container, container lid, and label which should be affixed to lid. Record weight to nearest 0.1 g on container label along with starting time to nearest ± 1/4 hour.
 - (5) Lightly grind 20 in x 20 in (508 mm x 508 mm) area to produce surface profile equal to International Concrete Repair Institute (ICRI) surface profile CSP-1 to CSP-2.
 - (6) At end of testing, weigh dish of anhydrous calcium chloride, including tape used to seal container, container lid, and label which should be affixed to lid. Record weight to nearest 0.1 g on container label along with ending time to nearest ± 1/4 hour.
- b) Test Report shall be submitted as specified in Informational Submittals in Part 1 of this specification.
- 3) Alkalinity Testing (pH) Test:
 - a) Testing shall be performed in accordance with ASTM F710.
 - b) Test with pH meter or pH paper.
 - c) Testing shall be taken at every location and at each time concrete moisture test is performed at those locations.
 - d) Clean floor to remove all oil, dirt, dust and any floor coating or sealer.
 - (1) Lightly grind, sand, or bead blasting. Do not remove more than 1/8 inch (3 mm) of concrete.
 - (2) Removal of more than 1/8 inch (3 mm) may give high pH reading.
 - (3) Failure to remove laitance will produce low, inaccurate pH reading.
 - e) Place several drops of water on clean surface, forming puddle approximately 1 inch (25 mm):
 - (1) Allow puddle to set for sixty (60) ± five (5) seconds, then dip pH paper or meter into water.
 - (2) Remove immediately and record test result.
 - f) Testing to be performed concurrently with concrete moisture testing.
 - g) Test Report shall be submitted as specified in Informational Submittals in Part 1 of this specification.

END OF SECTION

ATTACHMENTS

Concrete Moisture Testing Request and Proposal

Owner's Representative to complete Concrete Moisture Testing Request section below. Send completed form to Testing Agency. Testing Agency will complete Concrete Moisture Testing Proposal section and submit to Owner's Representative.

Agreement Between Owner And Testing Agency For Testing And Inspection Services (U.S.) and (Canada)

Project Information

Project Name:		
Project Address:		Property Number:
City:		Plan Type (New Construction Only):
State:	Zip Code:	Project Type: New Construction _____ Existing _____

Facility Type:

Type of New Flooring to be Installed (check all that apply):

Type of Concrete Slab: ___ Below grade ___ On grade ___ Above Grade / Suspended	_____ Years _____ Months
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Billing and Owner Contact Information (Owner's Representative)

Submit Quote and Report to: Project Manager _____ Facilities Manager _____

Project Manager:	Phone:	E-mail:
Facilities Manager:	Phone:	E-mail:
		Street Address:
City:	State:	Zip Code:



	<u>Carpet Installation Date</u>	
	<u>Proposed Testing Date</u>	

Reference information:

Concrete Moisture Testing Proposal

Proposal #:

Testing Agency Contact Information

Directions: Use this document to provide proposal for testing by doing following:

Review request information above. Email proposal to Owner's Representative.

Scope of Work	Comments	Cost
Standard Testing		\$
		\$
		\$
Additional Testing (if requested by Owner or Architect)		\$
Total		\$

Signatures - This form must be signed before testing can proceed.

Testing Agency:	Owner's Representative:
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SECTION 09 6466**WOOD ATHLETIC FLOORING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Wood Athletic Flooring:
 - a. Remove existing flooring system and prepare floor to receive wood flooring assembly.
 - b. Furnish and install hardwood floors complete with base, thresholds, and other items specified as described in Contract Documents.
 - c. Prepare and finish hardwood flooring system as described in Contract Documents.
 - d. Owner Furnished Testing Agency will test Alkalinity and Concrete Moisture of concrete slab before Pre-Installation Conference as specified in Section 09 0503 'Floor Substrate Preparation'.
- B. Products Installed But Not Furnished Under This Section.
1. Volleyball Floor Plates.
- C. Related Requirements:
1. Section 01 1200: 'Multiple Contract Summary' for Alkalinity and Concrete Moisture of concrete slab'.
 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 3. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
 - a. Provision of acceptable concrete substrate.
 - b. Installation of volleyball anchor sleeve.
 4. Section 09 0503: 'Floor Substrate Preparation' for:
 - a. Field Testing for Alkalinity and Concrete Moisture of concrete slab.
 - b. Floor substrate preparation.
 - c. Pre-installation conference for Sections under 09 6000 heading 'Flooring'.
 5. Section 11 6625: 'Volleyball Equipment' for furnishing of volleyball floor anchors.
- D. Related Requirements:
1. Section 01 0000: 'General Requirements':
 - a. Section 01 1200: 'Multiple Contract Summary' for Alkalinity and Concrete Moisture of concrete slab'.
 - b. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 2. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
 - a. Provision of acceptable concrete substrate.
 - b. Installation of volleyball anchor sleeve.
 3. Section 09 0503: 'Floor Substrate Preparation' for:
 - a. Field Testing for Alkalinity and Concrete Moisture of concrete slab.
 - b. Floor substrate preparation.
 - c. Pre-installation conference for Sections under 09 6000 heading 'Flooring'.
 4. Section 11 6625: 'Volleyball Equipment' for furnishing of volleyball floor anchors.

1.2 REFERENCES

- A. Association Publications:
1. American Concrete Institute, Farmington Hills, MI www.concrete.org. Abstracts of ACI Periodicals and Publications.
 - a. ACI 302.2R-06, *Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials* (August 15, 2006).

- B. Reference Standards:
 - 1. ASTM International:
 - a. ASTM D3273-16, 'Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber'.
 - b. ASTM E96/E96M-16, 'Standard Test Methods for Water Vapor Transmission of Materials'.
 - c. ASTM F2170-18, 'Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes'.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate completion of flooring installation with other trades.
- B. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference as specified in Section 09 0503 and held jointly with Section 09 6466 pre-installation conference.
 - 2. Conference may be held at project site or another convenient site. Participants may also attend by video or audio conference if approved by Project Manager.
 - 3. Schedule conference after substrate preparation and ONE (1) week minimum before installation of flooring system.
 - 4. In addition to agenda items specified in Section 01 3100 and Section 09 0503, review following:
 - a. Review Testing Agency testing report of Alkalinity and Concrete Moisture of concrete slab:
 - 1) Follow Testing Agency report regarding Alkalinity and Concrete Moisture of concrete slab as specified in Section 09 0503 'Floor Substrate Preparation'.
 - b. Review schedule for installation of wood athletic flooring and coordination with other trades.
 - c. Review Flooring Manufacturer's installation conditions verification procedure and requirements.
 - d. Review Building Ambient Conditions including normal levels of humidity, lighting, heating, and air conditioning for acceptability for beginning floor preparation and flooring installation.
 - e. Review high moisture remediation options when high moisture exists based on moisture testing specified in Section 09 0503 'Flooring Substrate Preparation'.
- C. Scheduling:
 - 1. Testing Agency to provide testing for Alkalinity and Concrete Moisture of concrete slab as specified in Section 09 0503 'Floor Substrate Preparation'.
 - 2. Notify Flooring Installer when Building Ambient Conditions requirements are met before installation of flooring system.

1.4 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data:
 - a. Moisture Suppression Membrane Underlayment (Option A):
 - 1) Provide product literature or cut sheet on underlayment.
 - b. Wood Athletic Flooring:
 - 1) Manufacturer's literature or cut sheet for flooring system and for finish system.
 - 2) Maintenance instructions.
- B. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Wood Athletic Flooring:
 - 1) Published installation instructions. Submit before pre-installation conference.
 - 2) Manufacturer's installation verification requirements and schedule.
 - b. Moisture Suppression Membrane Underlayment (Option A):
 - 1) Published installation instructions. Submit before pre-installation conference.
- C. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

- a. Warranty Documentation:
 - 1) Final, executed copy of Warranty.
- b. Record Documentation:
 - 1) Manufacturers documentation:
 - a) Manufacturer's literature.
 - 2) Testing Inspection Reports:
 - a) Testing Agency Testing Reports of Alkalinity and Concrete Moisture tests.

1.5 QUALITY ASSURANCE

- A. Testing and Inspection.
 - 1. Owner will provide Testing for Alkalinity and Concrete Moisture of concrete slab before installation of flooring:
 - a. See Section 01 1200: 'Multiple Contract Summary'.
 - b. See Section 09 0503: 'Flooring Substrate Preparation' for Field Testing for Alkalinity and Concrete Moisture of concrete slab.
- B. Qualifications: Section 01 4301 applies, but is not limited to following:
 - 1. Installer Qualifications:
 - a. Paint Installer:
 - 1) As recommended by Floor Finish Manufacturer.
 - b. Wood Athletic Flooring Installer:
 - 1) Qualified and approved by Manufacturer.
 - 2. Manufacturer Qualifications:
 - a. Not less than five (5) years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section.
 - b. Category Three Approved Manufacturers:
 - 1) Approval subject to agreement process approval.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
 - 1. Wood Athletic Flooring:
 - a. Do not deliver wood materials to Project until interior painting and tile work is completed but before pre-installation conference.
 - 2. Moisture Suppression Membrane Underlayment (Option A):
 - a. Deliver products to job site in original unopened containers or wrappings bearing all seals and approvals prior to installation.
- B. Storage And Handling Requirements:
 - 1. Wood Athletic Flooring:
 - a. Store wood materials on premises in area with environmental conditions as specified in Field Conditions to allow acclimation to moisture content that will prevail under environmental conditions under which building will be operated.
 - b. Pile bundled wood materials loosely to allow uniform acclimation.
 - 2. Moisture Suppression Membrane Underlayment (Option A):
 - a. Follow Manufacturer's instructions and precautions for storage of materials and accessories.
 - b. Store Seam Tape indoors in cool, dry area at temperatures between 60 deg F (16 deg C) and 80 deg F (27 deg C).

1.7 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Building Conditions:
 - a. Conditions inside building shall be brought to levels to be normal at occupancy of building.
 - b. Maintain these conditions from time flooring material is delivered to site to time Certificate of Substantial Completion is signed.

- c. Conditions include normal levels of humidity, lighting, heating, and air conditioning.
- 2. Concrete Slab:
 - a. General:
 - 1) Final determination as to whether or not a concrete slab is dry enough for flooring installation should be based on evaluating both Alkalinity and Concrete Moisture Vapor Emission Rate (MVER) testing as specified in Section 09 0503 'Floor Substrate Preparation'.
 - b. Alkalinity:
 - 1) Do not install wood flooring if alkalinity of concrete surface exceeds pH level 9. Corrective procedures are required.
 - c. Concrete Moisture Vapor Emission Rate (MVER):
 - 1) Testing conditions inside building shall be brought to same ambient temperature and relative humidity levels to be normal at occupancy of building. Conditions include normal levels of humidity, lighting, heating, and air conditioning.
 - 2) Follow requirements specified in Section 09 0503 'Floor Substrate Preparation' before installation of wood flooring.
- 3. Moisture Suppression Membrane Underlayment (Option A):
 - a. Acclimate membrane for twenty four (24) hours minimum at job site location.

1.8 WARRANTY

- A. Manufacturer Warranty:
 - 1. Wood Athletic Flooring:
 - a. Flooring Company's two year written guarantee covering labor and materials:
 - 1) Follow Manufacturer's verification procedures of installation conditions necessary for issuance of warranty.
 - 2. Moisture Suppression Membrane Underlayment (Option A):
 - a. Membrane Manufacturer's standard warranty.

PART 2 - PRODUCTS

2.1 SYSTEM

- A. Manufacturer:
 - 1. Category Three Approved Manufacturers. See Section 01 6200 for definitions of Categories.
 - a. Duracushion by Connor Sports Flooring Corp, Phoenix, AZ Jon Isaacs (800) 283-9522 FAX 847-290-9034, e-mail jisaacs@connorfloor.com..
 - b. Bio-Cushion by Robbins Sports Surfaces, Cincinnati, OH Todd Goodridge (800) 543 1913 ext 5933 FAX 513-871-7998, e-mail toddg@robbinsfloor.com.
- B. Product:
 - 1. Category Three Approved Products. See Section 01 6200 for definitions of Categories:
 - a. Connor Sports Flooring:
 - 1) Northern Hard Maple in random lengths.
 - b. Robbins Sports Surfaces:
 - 1) Northern Hard Maple in random lengths or continuous strip XL.
- C. Components:
 - 1. Moisture Suppression Membrane Underlayment (Option A):
 - a. Remediation if directed by Wood Athletic Flooring Manufacturers where high moisture exists based on moisture testing specified in Section 09 0503.
 - b. Material:
 - 1) Description:
 - a) Pre-formed moisture suppression membrane installed over concrete subfloor as floor covering underlayment where high moisture exists.
 - 2) Free-standing composite membrane with following characteristics:
 - a) Moisture transmission of less than 0.09 perm as per ASTM E96/E96M.

- b) Mold, Mildew and fungus resistant as per ASTM D3273: No growth.
- 3) Accessories:
 - a) Moisture suppression underlayment seam tape with pressure sensitive adhesive.
- 4) Type Two Acceptable Products:
 - a) VersaShield by Halex Corporation, Pomona, CA www.halexcorp.com.
 - b) Equal as approved by Owner's Representative and Wood Athletic Manufacture before installation. See Section 01 6200.
- 2. Resilient Pads: 2-1/4 inches (57 mm) wide by 3 inches (75 mm) long by 3/8 inch (9 mm) thick PVC pads with slots or air cells.
- 3. Subfloor Plywood: Four-ply minimum, APA graded and stamped, 15/32 inch (12 mm) CDX plywood.
- 4. Finish Flooring:
 - a. Hardwood: Northern Hard Maple, No. 3 and better grade MFMA trademarked and grade marked. 25/32 inch by 1-1/2 inch (19.8 mm by 38 mm) minimum, MFMA-RL or MFMA-FJ, with specially milled ends.
 - b. Hardwood: Northern Hard Maple, No. 2 and better grade MFMA trademarked and grade marked. 25/32 inch by 1-1/2 inch (19.8 mm by 38 mm) minimum, MFMA-RL or MFMA-FJ, with specially milled ends.
 - c. Fasteners: Power-driven, 2 inch (50 mm) long barbed cleats or coated staples recommended by Flooring Manufacturer.
- 5. Base: 2-1/2 inches by 2-1/2 inches by 1/8 inch (64 mm by 64mm by 3 mm) aluminum angle in clear anodized finish.
- 6. Threshold Plate: 5 inches (125 mm) wide by 1/4 inch (6 mm) thick aluminum, fluted on top, slightly tapered both edges in finish selected by Architect.
- 7. Finish:
 - a. Sealer: As recommended by Top Coat Manufacturer.
 - b. Top Coats:
 - 1) Description:
 - a) High gloss, high solids, oil-modified urethane or water based finishes.
 - 2) Oil Modified Urethane:
 - a) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Standard finish:
 - (a) Polyurethane 450 or Polyurethane 500 by Sealed Air Diversey Care, Sturtevant, WI www.diversey.com/woodcare.
 - (b) 450 Gym Finish or Gold Medalist 40 Gym Finish by Hillyard Industries, St. Joseph, MO www.hillyard.com.
 - (2) Oil Modified Low VOC one coat products (for Sustainable Design Requirements and/or low odor) Finish:
 - (a) Polyurethane 275 One Coat Finish by Sealed Air Diversey Care, Sturtevant, WI www.diversey.com/woodcare.
 - (b) 275 Gym Finish by Hillyard Industries, St. Joseph, MO www.hillyard.com.
 - 3) Water Based (for Sustainable Design Requirements and/or low odor) Finish:
 - a) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - (1) Ultra Low Odor Waterbased Finish (Waterborne Finish Crosslinker additive is not allowed to be used) by Sealed Air Diversey Care, Sturtevant, WI www.diversey.com/woodcare.
 - (2) 1907 / Basecoat Gym Finish by Hillyard Industries, St. Joseph, MO www.hillyard.com.
 - (3) ICON Finish with Star Sealer (when needed) by Hillyard Industries, St. Joseph, MO www.hillyard.com.
 - c. Game Lines:
 - 1) Colors:
 - a) Basketball: Black.
 - b) Volleyball: White, Grey or Blue.
 - 2) VOC Content:
 - a) Use only adhesives with VOC content of 50 g/l or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b) Game-Line and Marker Paint: VOC content of not more than 150 g/L.

8. Adhesives:
 - a. VOC Content:
 - 1) Manufacturer's standard for application indicated that has VOC content of 100 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLERS

- A. Category Three Approved Wood Athletic Flooring Installers. See Section 01 6200:
 1. Connor:
 - a. To be provided by addendum from Consultant.
 2. Robbins:
 - a. To be provided by addendum from Consultant.

3.2 EXAMINATION

- A. Verification Of Conditions:
 1. Follow Flooring Manufacturer's prescribed inspection procedure for determining acceptability of installation conditions, including environmental conditions in building during and after installation, moisture content of slab, flatness and levelness of slab, etc.
 2. Verify concrete surfaces are sufficiently cured and moisture content is within acceptable levels before beginning installation.
 3. Verify ventilation requirements as specified in Field Conditions in Part 1 of this specification have been maintained before proceeding with applying wood floor finish.
- B. Evaluation And Assessment:
 1. Wood Athletic Flooring:
 - a. Verify before installing aluminum angle base, location of framing member base plate or vertical framing member if attachment to framing member base plate is not feasible.

3.3 PREPARATION

- A. Surface Preparation:
 1. Correct deficiencies identified during Pre-Installation Conference and confirm acceptance and approval of substrate with Architect before beginning installation of flooring system.
 2. Concrete floor slab patching:
 - a. Cracks, chips and joints must be properly patched or repaired.
 3. Concrete surface cured, clean, dry, and free of foreign substances that will compromise flooring installation.
 - a. Removal of curing compounds.
 - b. Remove paint, sealer, grease, oil, silicone sealants, and other materials incompatible with flooring adhesives.
 - c. Removal of overspray from painted walls (essential so glue will stick).
 4. Moisture vapor emission tests and alkalinity test of concrete slab has been performed.
 5. Vacuum and damp mop floor areas to receive flooring before flooring installation.

3.4 INSTALLATION

- A. Do not install wood flooring until interior 'wet type' systems are dried out and overhead trades have completed work in wood floor areas.
- B. Moisture Suppression Membrane Underlayment (Option A):
 1. Remediation if directed by Wood Floor Manufacturers where high moisture exists based on moisture testing specified in Section 09 0503.

2. Installation:
 - a. Install membrane with smooth film side facing concrete slab.
 - b. Install in accordance with membrane manufacturer's current written installation instructions.
 - c. Do not install with mechanically fastened wood floor system.
 - d. Do not install below grade where hydrostatic pressure exists.
 3. Apply Manufacturer's approved adhesive as per written installation instructions.
 4. Protect membrane from damage during installation and application of adhesive:
 - a. Do not tear, rip, puncture, or delaminate membrane when applying adhesive.
 - b. Repair damaged areas according to membrane manufacturer's instructions before wood flooring installation.
 - c. Provide continuous, intact moisture suppression membrane under entire designated flooring area.
 5. Install wood flooring on top of underlayment membrane.
- C. Cushioned Panels:
1. Place 32 resilient pads on under-side of first layer of plywood **6 inches (150 mm)** in from edges of plywood and **12 inches (300 mm)** on center each way.
 2. Lay plywood parallel to short dimension of room with **1/4 inch (6 mm)** spacing at joints.
 3. Place second layer of plywood on diagonal with first layer, with **1/4 inch (6 mm)** joints, and secure by screwing, nailing, or stapling, as acceptable to Flooring Manufacturer, at **12 inches (300 mm)** on center.
 4. Expansion Provisions:
 - a. Leave **1-1/2 inches (38 mm)** gap between flooring and walls for expansion at perimeters.
- D. Volleyball Floor Plates:
1. Install in accordance with Plate Manufacturer's instructions and as detailed.
- E. Laying And Power Nailing of Finish Flooring:
1. Lay flooring parallel to long dimension of room.
 2. Tightly drive end joints and properly fit side joints to meet requirements of Manufacturer to meet humidity requirements.
 3. Machine nail.
- F. Aluminum Angle Base:
1. Wood-Framed Walls:
 - a. Firmly attach only to wall with panhead, cadmium plated, wood screws.
 - b. Length of screws shall be sufficient to embed in substrate **1-1/2 inches (38 mm)** minimum.
 - c. Attachment to wall:
 - 1) Framing member base plate attachment:
 - a) Locate screws **3 inches (75 mm)** maximum from edge and **24 inches (600 mm)** maximum on center spacing between screws into framing member base plate.
 - 2) Vertical Framing member attachment:
 - a) Match vertical framing member.
 2. Masonry Walls:
 - a. Firmly attach only to wall with panhead, cadmium plated, self-tapping screws and plastic anchors.
 - b. Length of screws shall be sufficient to embed in substrate one inch minimum.
 - c. Attachment to wall:
 - 1) Framing member base plate attachment:
 - a) Locate screws and anchors **3 inches (75 mm)** maximum from edge and **24 inches (600 mm)** maximum on center spacing between screws and anchors into framing member base plate.
 - 2) Vertical Framing member attachment:
 - a) Match vertical framing member.
 3. Placing screws:
 - a. Place screws approximately one inch down from top of base.
 - 1) If screw attachment will miss framing member base plate, locate attachment into vertical framing member.
 4. Spacer:
 - a. Attach one **3/16 inch by 1/2 inch by one-inch (5 mm by 13 mm by 25 mm)** masonite spacer to metal angle base immediately above each screw hole with contact cement.

5. Tighten screws to bring base into gentle contact with floor.
 - a. Do not interfere with free movement of floor.
 6. Miter corner joints and grind toe of base on outside corners to **1/2 inch (13 mm)** radius. Grind or file down burrs and rough or sharp edges at joints.
 7. Leave in true alignment with **3/16 inch (5 mm)** space between wall and base.
- G. Aluminum Threshold:
1. Neatly and substantially anchor aluminum threshold plates located across expansion gaps at door and other floor surface openings with permanent type rust proof anchors. Do not fasten to wood floor.
 2. Do not lag fixtures, equipment, plates, outlet boxes, or other items through subfloor to floor unless adequate provision is made for expansion.
- H. Sanding Sequence:
1. Make sure floor is free of moisture.
 2. Sweep floors clean.
 3. Sand with heavy, power driven type sander. Use dust accumulator on machine.
 4. Begin sanding with No. 36 or No. 40 grit sandpaper. Sand on diagonal if required to level boards.
 5. Proceed with medium grit, 50 or 60 grit sandpaper. Perform this sanding and subsequent sanding passes in direction of grain of floor.
 6. Sand edges with No. 60 or 80 grit spinner paper.
 7. Sand entire floor with No.80 or 100 grit sandpaper.
 8. Disk and entire floor with No. 100 disk paper. Finish with 120 screens.
 9. Scrape and hand-sand corners and other areas not reached by machine.
- I. Finishing:
1. Allow for adequate ventilation to insure proper curing.
 2. Apply two (2) coats of sealer at rate and instructions recommended by Finish Manufacturer. Vacuum, screen and tack between coats as recommended by Finish Manufacturer. (Note: solvent based sealer is preferred were feasible).
 3. Proper screening, vacuuming and tacking procedures should be followed at each stage of finishing process.
 4. Apply game lines.
 5. Apply top coats with ample time between coats for material to properly dry before applying additional coats:
 - a. Coverage per gallon (liter) shall be at rate and number of coats recommended by Finish Manufacture (Typically two (2) coats unless using high solids high performance products).
 - b. Top coats can consist of additional sealer or lower solids product followed with final high solids or high performance top coat.

3.5 FIELD QUALITY CONTROL

- A. Field Tests:
1. See Section 09 0503 'Flooring Substrate Preparation' for Field Testing for Alkalinity and Concrete Moisture of concrete slab.

3.6 CLEANING

- A. Waste Management:
1. Installer's Responsibility:
 - a. All work areas are to be kept clean, clear and free of debris at all times.
 - b. Disposal of rubbish in provided dumpster(s).
 2. Contractor's Responsibility:
 - a. Provide adequate waste receptacles (dumpsters) and dispose of Owner Furnished materials from building and property as specified in Section 01 7400.

3.7 PROTECTION**A. Contractor's Responsibility:**

1. Protect flooring from abuse, vandalism, contaminants, or damage occurring after installation is complete.
2. Protect floor finish until Substantial Completion.
3. Keep floor free of traffic for seventy-two (72) hours minimum after application of final coat.

END OF SECTION

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DIVISION 31: EARTHWORK

31 0500 COMMON WORK RESULTS FOR EARTHWORK

31 0501 COMMON EARTHWORK REQUIREMENTS

31 1000 SITE CLEARING

31 1123 AGGREGATE BASE

31 2000 EARTH MOVING

31 2213 ROUGH GRADING

31 2216 FINE GRADING

31 2316 EXCAVATION

31 2323 FILL

END OF TABLE OF CONTENTS

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

- A. Includes But Not Limited to:
 1. General procedures and requirements for earthwork.
- B. Related Requirements:
 1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
 2. Pre-Installation conferences held jointly with Section 31 0501 as described in Administrative Requirements on Part 1 of this specification section:
 3. Section 32 9001: 'Common Planting Requirements':
 - a. Pre-installation conference held jointly with other landscape related sections.

1.2 REFERENCES

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

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 1. Participate in MANDATORY pre-installation conference for common earthwork sections:
 - a. Schedule conference after completion of site clearing but before beginning grading work.
 - b. Participate in pre-installation conference held jointly with following sections:
 - 1) Section 03 3111: 'Cast-In-Place Structural Concrete'.

- 2) Section 31 1123: 'Aggregate Base'.
- 3) Section 31 2213: 'Rough Grading'.
- 4) Section 31 2216: 'Fine Grading'.
- 5) Section 31 2316: 'Excavation'.
- 6) Section 31 2323: 'Fill'.
- c. In addition to agenda items specified in Section 01 3100, review following:
 - 1) Review Geotechnical Evaluation Report.
 - 2) Review common earthwork schedule.
 - 3) Review protection requirements.
 - 4) Review cleaning requirements.
 - 5) Review safety issues.
 - 6) Review field tests and inspections requirements.
- d. In addition to agenda items specified above, review following. These are items that will occur before pre-installation conference for landscape sections:
 - 1) Review clearing and grubbing requirements.
 - 2) Review topsoil stripping and stockpiling requirements.
 - 3) Review landscape grading requirements.
 - 4) Review landscape finish grade tolerance requirements.
 - 5) Review landscape and plant tolerances.
 - 6) Review surface preparation of landscape and planting areas.
 - 7) Review additional agenda items as specified in related sections listed above.
- e. In addition to agenda items specified in Section 01 3100 and Section 32 9001, review following that these items have been installed correctly:
 - 1) Review topsoil placement requirements.
 - 2) Review topsoil surface preparation requirements.
 - 3) Review topsoil depth requirements.
 - 4) Review landscape finish grade tolerance requirements.
 - 5) Review surface preparation of landscape and planting areas.

B. Sequencing:

1. General Earthwork:
 - a. Excavation.
 - b. Rough Grading.
 - c. Fill.
 - d. Fine Grading.
 - e. Aggregate Base or Topsoil Grading.

1.4 QUALITY ASSURANCE

A. Testing And Inspection:

1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - a. Owner will employ testing agencies to perform testing and inspection as specified in Field Quality Control in Part 3 of this specification:
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
 - 2) See Section 01 1200: 'Multiple Contract Summary'.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:

1. Forty-eight (48) hours minimum before performing any work on site, contact Blue Stakes (811) to arrange for utility location services.
2. Perform minor, investigative excavations to verify location of various existing underground facilities at sufficient locations to assure that no conflict with the proposed work exists and sufficient clearance is available to avoid damage to existing facilities.
3. Perform investigative excavating ten (10) days minimum in advance of performing any excavation or underground work.
4. Upon discovery of conflicts or problems with existing facilities, notify Architect by phone or fax within twenty-four (24) hours. Follow telephone or fax notification with letter and diagrams indicating conflict or problem and sufficient measurements and details to evaluate problem.

3.2 PREPARATION

A. Protection:

1. Spillage:
 - a. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways.
 - b. Remove spillage and sweep, wash, or otherwise clean project, streets, and highways.
2. Dust Control:
 - a. Take precautions necessary to prevent dust nuisance, both on-site and adjacent to public and private properties.
 - b. Correct or repair damage caused by dust.
3. Existing Plants And Features:
 - a. Do not damage tops, trunks, and roots of existing trees and shrubs on site that are intended to remain.
 - b. Do not use heavy equipment within branch spread.
 - c. Interfering branches may be removed only with permission of Architect.
 - d. Do not damage other plants and features that are to remain.

3.3 REPAIR / RESTORATION

- A. Adjust existing covers, boxes, and vaults to grade.
- B. Replace broken or damaged covers, boxes, and vaults.
- C. Independently confirm size, location, and number of covers, boxes, and vaults that require adjustment.

3.4 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform The Work or Contractor's own Testing and Inspection services.
2. Testing and inspection of earthwork operations is required.
3. Field Tests and Laboratory Tests:
 - a. Owner reserves right to require additional testing to re-affirm suitability of completed work including compacted soils that have been exposed to adverse weather conditions.
4. Field Inspections:
 - a. Notify Architect forty-eight (48) hours before performing excavation or fill work.
 - b. If weather, scheduling, or any other circumstance has interrupted work, notify Architect twenty-four (24) hours minimum before intended resumption of grading or compacting.

B. Non-Conforming Work:

1. If specified protection precautions are not taken or corrections and repairs not made promptly, Owner may take such steps as may be deemed necessary and deduct costs of such from monies

due to Contractor. Such action or lack of action on Owner's part does not relieve Contractor from responsibility for proper protection of The Work.

END OF SECTION

SECTION 31 1123**AGGREGATE BASE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install the following as described in Contract Documents:
 - a. Aggregate Base:
 - 1) Interior concrete slabs-on-grade.
 - 2) Miscellaneous exterior concrete (sidewalks, curb, gutter and equipment pads).
 - 3) Asphalt paving.
- B. Related Requirements:
1. Section 01 0000: 'General Requirements':
 - a. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
 - b. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 2. Section 03 3111: 'Cast-In-Place Structural 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 2213: 'Rough Grading'.
 5. Section 31 2216: 'Fine Grading' for subgrade procedures.
 6. Section 31 2323: 'Fill' for compaction procedures and tolerances.

1.2 REFERENCES

- A. Definitions:
1. Aggregate (Asphalt Paving):
 - a. Aggregate: A hard inert mineral material, such as gravel, crushed rock, slag, or sand.
 - b. Coarse Aggregate: Aggregate retained on No. 8 (2.36 mm) sieve.
 - c. Dense-Graded Aggregate: Aggregate that is graded from maximum size down through filler with object of obtaining an asphalt mix with controlled void content and high stability.
 - d. Fine Aggregate: Aggregate passing No. 8 (2.36 mm) sieve.
 - e. Reclaimed Asphalt Pavement (RAP): Existing asphalt mixture that has been pulverized, usually by milling, and is used like an aggregate in recycling of asphalt pavements.
- B. Reference Standards:
1. ASTM International:
 - a. ASTM C131/C131M-14, 'Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine'.
 - b. ASTM D1556/D1556M-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method'.
 - c. ASTM D1557-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))'.
 - d. ASTM D1883-16, 'Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils'.
 - e. ASTM D2167-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method'.
 - f. ASTM D2419-14, 'Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate'.
 - g. ASTM D4318-17, 'Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils'.

- h. ASTM D6938-17, 'Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)'.
- i. ASTM E1643-18a, 'Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs'.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:

- 1. Participate in MANADORY pre-installation conference as specified in Section 31 0501.
- 2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
 - a. Review requirements and frequency of testing and inspections.
 - b. Review aggregate base installation requirements.
 - c. Review proposed miscellaneous exterior concrete schedule.
 - d. Review proposed asphalt paving schedule.
 - e. 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. Aggregate Base:
 - a. Install aggregate base at location shown in Contract Drawings.
- 3. 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.
- 3. Asphalt Paving:
 - a. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing aggregate base to allow inspection of aggregate base.

1.4 SUBMITTALS

A. Closeout Submittals:

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

1.5 QUALITY ASSURANCE

A. Testing And Inspection:

- 1. Owner will provide Testing and Inspection for aggregate base:
 - a. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - b. Owner will employ testing agencies to perform testing and inspection for aggregate base as specified in Field Quality Control in Part 3 of this specification.

- 1) Owner’s employment of an independent Testing Agency does not relieve Contractor of Contractor’s obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
- 2) See Section 01 1200: ‘Multiple Contract Summary’.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

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

1.7 FIELD CONDITIONS

A. Ambient Conditions:

- 1. Do not perform work during unfavorable conditions as specified below:
 - a. Aggregate Base:
 - 1) Presence of free surface water.
 - 2) Over-saturated sub base materials.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate Base:

- 1. Under Interior Slab-On-Grade Concrete (Section 03 3111 'Cast-In-Place Structural Concrete'):

a. New Aggregate Base:

- 1) Gravel: 3/4 inch 18mm minimum to one inch 25 mm maximum well-graded, clean gravel or crushed rock.
- 2) Base type gravel or crushed rock, graded by weight as follows (three-quarter to one-inch clean gap-graded gravel):
 - a) Road Base type gravel or crushed stone (slag not allowed), graded as follows:

(1) Sieve	Percent of Weight Passing	
(a) 1 inch	(25.4 mm)	100
(b) 3/4 inch	(19.0 mm)	90 - 80
(c) 1/2 inch	(12.7 mm)	20 - 40
(d) 3/8 inch	(9.5 mm)	5 - 10
(e) No. 4	(4.750 mm)	0 - 12

- 2. Under Exterior Concrete (Section 03 3111 'Cast-In-Place Structural Concrete') excluding Concrete Paving):

a. New Aggregate Base:

- 1) Road Base to conform to State DOT Specifications.

- 3. Under Asphalt Paving (Section 32 1216 'Asphalt Paving'):

a. New Aggregate Base:

- 1) Road Base to conform to 1-1/2 inches (38 mm) minus State DOT Specifications and Gradations.
- 2) Aggregate base shall be non-plastic.

b. Reclaimed Asphalt and Concrete Pavement (RAP):

- 1) Pulverized Portland or asphalt concrete paving mixed uniformly with existing aggregate base.

- 2) Conform to following gradation:

a) Sieve	Percent of Weight Passing	
(1) 2 inch	(50.0 mm)	100
(2) 1 1/2 inch	(38.0 mm)	85 - 100
(3) 3/4 inch	(19.0 mm)	60 - 80
(4) No. 4	(4.750 mm)	30 - 50
(5) No. 200	(0.075 mm)	5 - 12

- 3) Quality Requirements as established by testing:
 - a) R-value (CBR value as per ASTM D1883): 70 percent minimum.
 - b) Sand Equivalent (ASTM D2419): 25 percent minimum.
 - c) ASTM C131/C131M (Los Angeles Abrasion): 50 percent maximum.
 - d) ASTM D4318 (Atterberg Limits): Non-Plastic.

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 (Asphalt Paving):
 1. Subgrade:
 - a. Finish grade parking surface area to grades required by Contract Documents.
 - b. Aggregate base and paving must be placed before any moisture or seasonal changes occur to subgrade that would cause compaction tests previously performed to be erroneous. Recompact and retest subgrade soils that have been left exposed to weather.

3.2 INSTALLATION

- A. Aggregate Base:
 1. General:
 - a. Do not place aggregate base material when subgrade is frozen or unstable.
 - b. Spread aggregate base material with equipment except in limited or restricted areas where use of hand spreading is allowed.
 - c. Spread aggregate base material in manner that does not break down material and eliminates segregation, ruts, and ridges.
 - d. Correct damage to aggregate base caused by construction activities and maintain corrected aggregate base until subsequent course is placed.
 - e. Do not allow traffic on aggregate base.
 - f. Remove all standing storm water.
 2. Under interior concrete slab-on-grade aggregate base:
 - a. Place **4 inches (100 mm)** minimum of aggregate base under vapor retarder, level, and compact with vibratory plate compactor.
 3. Under 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.
 4. Under miscellaneous exterior concrete aggregate base:

- a. Except under mow strips, place **4 inches (100 mm)** minimum of aggregate base, level, and compact as specified in Section 31 2323.
5. Asphalt paving aggregate base:
 - a. 6 in. thick minimum after compaction in accordance with Contract Drawings.
 - b. If roller is smaller than **8 ton (7260 kg)**, lay aggregate base and compact in two courses.
 - c. Compact as specified in Section 31 2323.
 - d. Priming: Prime aggregate base with application of **0.2 to 0.5 gallons (2 to 5 liters)** of asphalt cement primer per square **yard (meter)** if pavement will be laid more than three days after compaction of aggregate base, or if precipitation is anticipated between completion of compaction of aggregate base and laying of asphalt paving.
 - e. Recompact unprimed aggregate base if it receives precipitation before pavement is laid.
 - f. Remove or repair improperly prepared areas as directed by Architect.

B. Tolerances:

1. Asphalt Paving Areas:
 - a. 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.
 - 3) Finished base course shall be true to line and grade within plus or minus **1/4 inch in 10 feet (6 mm in 3 meters)**.
 - 4) Maximum variation from required grades shall be **1/10 of one foot (28 mm)**.

3.3 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor.
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
 - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
 2. Aggregate Base:
 - a. Interior slab-on-grade concrete areas:
 - 1) Testing Agency shall provide testing and inspection for interior aggregate base.
 - 2) Number of tests may vary at discretion of Architect.
 - 3) Testing Agency will test compaction of base in place according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Tests will be performed at following frequency:
 - a) Building Slab Areas: One test for every **2,500 sq. ft. (232 sq. m)** or less of building slab area but no fewer than three tests.
 - b. Miscellaneous exterior concrete areas:
 - 1) Testing Agency shall provide testing and inspection for exterior aggregate base.
 - 2) Number of tests may vary at discretion of Architect.
 - 3) Testing Agency will test compaction of base in place according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Tests will be performed at following frequency:
 - a) Sitework Areas: One test for every **10,000 sq. ft. (930 sq. m)** or less of exterior pads area but no fewer than three tests.
 - c. Asphalt paving area:
 - 1) Testing Agency shall provide testing and inspection for exterior aggregate base.
 - 2) Number of tests may vary at discretion of Architect.
 - 3) Testing Agency will test compaction of base in place according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Tests will be performed at following frequency:
 - a) Sitework Areas: One test for every **10,000 sq. ft. (930 sq. m)** or less of exterior pads area but no fewer than three tests.

END OF SECTION

SECTION 31 2213**ROUGH GRADING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Perform rough grading work required to prepare site for construction as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
 - 2. Section 03 3053: Miscellaneous Exterior Cast-In-Place Concrete.
 - 3. Section 31 0501: 'Common Earthwork Requirements' for:
 - a. General procedures and requirements for earthwork.
 - b. Pre-installation conference held jointly with other common earthwork related sections.
 - 4. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
 - 5. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
 - 6. Section 31 2316: 'Excavation'.
 - 7. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
 - 1. Participate in MANDATORY pre-installation conference as specified in Section 31 0501:
 - 2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
 - a. Identify benchmark to be used in establishing grades and review Contract Document requirements for grades, fill materials, and topsoil.
 - b. Examine site to pre-plan procedures for making cuts, placing fills, and other necessary work.

PART 2 - PRODUCTS**2.1 MATERIALS**

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

PART 3 - EXECUTION**3.1 EXAMINATION**

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

3.2 PREPARATION

- A. Protection Of In-Place Conditions:
 - 1. When existing grade around existing plants to remain is higher than new finish grade, perform regrading by hand.
 - 2. Do not expose or damage shrub or tree roots.

3.3 PERFORMANCE

- A. Subgrade (Natural Soils):
 - 1. Subgrade beneath compacted fill or aggregate base under asphalt or concrete paving shall be constructed smooth and even.

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

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

END OF SECTION

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

- A. Includes But Not Limited To:
1. Perform fine grading of subgrade work required to prepare site for paving finish grading and for placement of topsoil as described in Contract Documents.
 2. Asphalt Paving:
 - a. Prepare natural soil subgrade as described in Section 31 2213 'Rough Grading' or prepare fill subgrade as described in this specification section for asphalt paving.
- B. Related Requirements:
1. Section 01 0000: 'General Requirements':
 - a. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
 - b. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
 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 1413: 'Topsoil Stripping And Stockpiling' for stripping and storing of existing topsoil.
 5. Section 31 2213: 'Rough Grading' for grading and preparation of natural soil subgrades below fill and aggregate base materials.
 6. Section 31 2316: 'Excavation'.
 7. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
1. Participate in MANDATORY pre-installation conference as specified in Section 31 0501 and Section 32 9001.
 2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
 - a. Review backfill requirements.
 - b. Review geotechnical report.
 - c. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
 - 1) Review requirements and frequency of testing and inspections.
- B. Scheduling:
1. Notify Testing Agency and Architect twenty-four (24) hours minimum before installation of fill / engineered fill to allow inspection.
 2. Allow special inspector to review all subgrades and excavations to determine if site has been prepared in accordance with geotechnical report prior to placing any fill, aggregate base or concrete.
 3. Allow inspection and testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after inspections and test results for previously compacted work comply with requirements.

1.3 SUBMITTALS

- A. Closeout Submittals:

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

1.4 QUALITY ASSURANCE

- A. Testing And Inspection:
 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 2. Owner will provide Testing and Inspection for fill / engineering fill:
 - a. Owner will employ testing agencies to perform testing and inspection for fill / engineering fill as specified in Field Quality Control in Part 3 of this specification.
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
 - 2) See Section 01 1200: 'Multiple Contract Summary'.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection Of In-Place Conditions: Protect utilities and site elements from damage.
- B. General:
 1. Limit use of heavy equipment to areas no closer than **6 feet (1.80 meter)** from building or other permanent structures.
- C. Surface Preparation:
 1. Landscaping and Planting Areas:
 - a. Before grading, dig out weeds from planting areas by their roots and remove from site. Remove rocks larger than **1-1/2 inches (38 mm)** in size and foreign matter such as building rubble, wire, cans, sticks, concrete, etc.
 - b. Remove imported paving base material present in planting areas down to natural subgrade or other material acceptable to Architect.
 2. Asphalt Paving:
 - a. Survey and stake parking surfaces to show grading required by Contract Documents.
 - b. Subgrade (material immediately below aggregate base):
 - 1) Compact subgrade as specified in Section 31 2213 (natural soils) and Section 31 2323 (fill).
 - 2) Fine grade parking surface area to grades required by Contract Documents.
 - 3) Subgrade to be constructed smooth and even.

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. Aggregate Base (Asphalt Paving) Tolerances:
 - a. Aggregate base shall be 6 inches (150 mm) thick minimum after compaction, except where shown thicker on Drawings.
 - b. Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.

3.3 FIELD QUALITY CONTROL

A. Field Tests And Inspections:

1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor:
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
 - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
2. Site Preparation:
 - a. Prior to placement of fill / engineered fill, inspector shall determine that site has been prepared in accordance with geotechnical report.
 - b. Footing subgrade: At footing subgrades, Certified Inspector is to verify that soils conform to geotechnical report.
3. Fill / Engineered Fill:
 - a. Testing Agency shall provide testing and inspection for fine grading.
 - b. Number of tests may vary at discretion of Architect.
 - c. Testing Agency is to provide one (1) moisture-maximum density relationship test for each type of fill material.

END OF SECTION

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SECTION 31 2316**EXCAVATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Perform Project excavating and trenching as described in Contract Documents, except as specified below.
 - 2. Procedure and quality for excavating and trenching performed on Project under other Sections unless specifically specified otherwise.

- B. Related Requirements:
 - 1. Section 31 0501: 'Common Earthwork Requirements' for:
 - a. General procedures and requirements for earthwork.
 - b. Pre-installation conference held jointly with other common earthwork related sections.
 - 2. Section 31 1100: Clearing and Grubbing.
 - 3. Section 31 1123: 'Aggregate Base'.
 - 4. Section 31 1413: 'Topsoil Stripping and Stockpiling'.
 - 5. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
 - 6. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
 - 7. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.
 - 8. Performance of excavating inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

1.2 ADMINISTRATIVE REQUIREMENTS

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

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

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

3.2 PREPARATION

- A. Protection of Existing Utilities:
 - 1. Protect existing utilities identified in Contract Documents during excavation.
 - 2. If existing utility lines not identified in Contract Documents are encountered, contact Architect before proceeding.

3.3 PERFORMANCE

- A. Interface With Other Work:
1. Section 31 2213: 'Rough Grading' for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
 2. Section 31 2216: 'Fine Grading' for grading of subgrade below aggregate base and topsoil.
- B. Excavation:
1. 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.
 2. Utility Trenches:
 - a. Unless otherwise indicated, excavation shall be open cut. Short sections of trench may be tunneled if pipe or duct can be safely and properly installed and backfill can be properly tamped in tunnel sections and if approved by Architect.
 - b. Excavate to proper alignment, depth, and grade. Excavate to sufficient width to allow adequate space for proper installation and inspection of utility piping.
 - c. If trenches are excavated deeper than required, backfill until trench bottom is proper depth with properly compacted native material.
 - d. Pipe **4 Inches (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.
 3. If unusual excavating conditions are encountered, stop work and notify Architect.

3.4 REPAIR / RESTORATION

- A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

3.5 CLEANING

- A. Debris and material not necessary for Project are property of Contractor and are to be removed before completion of Project. However, if material necessary for Project is hauled away, replace with specified fill / backfill material.

END OF SECTION

DIVISION 32: EXTERIOR IMPROVEMENTS

32 0100 OPERATION AND MAINTENANCE OF EXTERIOR IMPROVEMENTS

32 0113 ASPHALT PAVING REPAIR: FULL DEPTH PATCH

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SECTION 32 0118**ASPHALT PAVING REPAIR: Full Depth Patch****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Remove and replace paving and aggregate base in specific areas as described in Contract Documents and includes:
 - a. Install new asphalt that conforms to the state's Department of Transportation (DOT) requirements adapted to the location of the project.
 - b. Apply asphaltic material (tack coat) to existing asphalt concrete or Portland concrete surfaces before asphalt paving patch is placed.
- B. Related Requirements:
 - 1. Section 01 0000: 'General Requirements':
 - a. Section 01 1200: 'Multiple Contract Summary'.
 - 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 32 0117.01: 'Asphalt Paving Crack Seal'.
 - 3. Section 32 0117.02: 'Asphalt Paving Crack Fill'.

1.2 PRICE AND PAYMENT PROCEDURES

- A. Alternates:
 - 1. Provide alternate bid as specified in Section 01 2300: 'Alternates' if Asphalt Reinforcement Fibers will be added to hot asphalt mix:
 - a. Alternate No. A: 'Asphalt Reinforcement Fibers'.

1.3 REFERENCES

- A. Association Publications:
 - 1. Asphalt Institute:
 - a. MS-2, *Mix Design Methods*' (7th Edition).
- B. Definitions:
 - 1. Aggregate: A hard inert mineral material, such as gravel, crushed rock, slag, or sand.
 - a. Coarse Aggregate: Aggregate retained on or above No. 8 (2.36 mm) sieve.
 - b. Coarse-Graded Aggregate: Aggregate having predominance of coarse sizes.
 - c. Dense-Graded Aggregate: Aggregate that is graded from maximum size down through filler with object of obtaining an asphalt mix with controlled void content and high stability.
 - d. Fine Aggregate: Aggregate passing No. 8 (2.36 mm) sieve.
 - e. Fine-Graded Aggregate: Aggregate having predominance of fine sizes.
 - f. Mineral Filler: Fine mineral product at least 70 percent of which passes a No. 200 (75µm) sieve.
 - 2. Air Voids: Total volume of small air pockets between coated aggregate particles in asphalt cement concrete (ACC); expressed as percentage of bulk volume of compacted paving mixture.

3. Anti-Stripping Agent: Chemicals added to bitumen to improve the adhesion of the bitumen to hydrophilic aggregates
 4. Asphalt Binder: Asphalt cement or modified asphalt cement that binds aggregate particles into dense mass.
 - a. Asphalt Cement used in paving applications that has been classified according to the Standard Specification for Performance Graded Asphalt Binder, AASHTO Designation MP 320. It can be either unmodified or modified Asphalt Cement, as long as it complies with specifications.
 5. Pre-emergent Herbicide: Chemical that is applied before weeds emerge. It acts by killing weed seedlings and /or establishing layer of chemical on or near soil surface that is toxic to germinating seeds and young seedlings. Herbicide are not soil Sterilants that temporarily or permanently prevents growth of all plants and animals.
 6. Tack Coat: Very light application of liquid asphalt, or asphalt emulsion diluted with water.
- C. Reference Standards:
1. American Association of State and Highway Transportation Officials:
 - a. AASHTO T 322-07(2016), 'Standard Method of Test for Determining the Creep Compliance and Strength of Hot-Mix Asphalt (HMA) Using the Indirect Tensile Test Device.
 2. ASTM International:
 - a. ASTM D1556/D1556M-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method'.
 - b. 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))'.
 - c. ASTM D2167-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method'.
 - d. ASTM D2172/D2172M-17, 'Standard Test Methods for Quantitative Extraction of Bitumen From Bituminous Paving Mixtures'.
 - e. ASTM D2256/ D2256M-10(2015), 'Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method'.
 - f. ASTM D6932/D6932M-08(2013), 'Standard Guide for Materials and Construction of Open-Graded Friction Course Plant Mixtures'.
 - g. ASTM D6938-17a, 'Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)'.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
1. Participate in pre-installation conference as specified in Section 01 3100:
 2. Schedule paving repair pre-installation conference to be held jointly with any other 'Asphalt Surface Treatment' section that involve asphalt maintenance.
 3. In addition to agenda items specified in Section 01 3100, review following:
 - a. Review pre-emergent herbicide as specified in Section 31 0117.01 'Asphalt Paving Crack Seal' or Section 31 0117.02 'Asphalt Paving Crack Fill' for protection of adjoining property and planting area on site requirements, schedule and application requirements to be applied before asphalt paving patch areas are repaired.
 - b. Review aggregate base installation requirements.
 - c. Review asphalt paving repair (full depth patch) schedule.
 - d. Review asphalt paving repair (full depth patch) mix design.
 - e. Review safety issues.
 - f. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
 - 1) Review requirements and frequency of testing and inspections.
- B. Scheduling: Notify Testing Agency and Architect twenty four (24) hours minimum before placing aggregate base.
2. Notify Testing Agency and Architect twenty four (24) hours minimum before placing asphalt paving / full depth patch.

1.5 SUBMITTALS

- A. Informational Submittals:
 - 1. Manufacturer Instructions:
 - a. Asphalt Paving Patch:
 - 1) Provide mix design.
 - 2. Qualification Statement:
 - a. Installer:
 - 1) Provide Qualification documentation if requested by Owner's Representative.
- B. Closeout Submittals:
 - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Record Documentation:
 - 1) Manufacturer's documentation:
 - a) Asphalt Manufacturer's product literature.
 - b) Pre-emergent Herbicide product literature and application documentation.
 - 2) Testing and Inspection Reports:
 - a) Testing Agency Testing and Inspecting Reports of asphalt paving repair (full depth patch) and aggregate base.

1.6 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies but not limited to following:
 - 1. Installer:
 - a. Minimum five (5) years experience in asphalt surface treatment installations.
 - b. Minimum five (5) years satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding:
 - 2. Upon request, submit documentation.
- B. Testing and Inspection:
 - 1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
 - 2. Owner will provide Testing and Inspection for asphalt paving repair (full depth patch) and aggregate base:
 - a. Owner will employ testing agencies to perform testing and inspection for asphalt paving repair (full depth patch) and aggregate base as specified in Field Quality Control in Part 3 of this specification.
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.
 - 2) See Section 01 1200: 'Multiple Contract Summary'.

1.7 FIELD CONDITIONS

- A. Ambient Conditions:
 - 1. Tack Coat:
 - a. Apply only when air and roadbed temperatures in shade are greater than 40 deg F (4.4 deg C). Temperature restrictions may be waived only upon written authorization from Architect or Civil Engineer.
 - b. Do not apply to wet surfaces.
 - c. Do not apply when weather conditions prevent tack coat from adhering properly.
 - 2. Asphalt Paving Patch:
 - a. Do not perform work during following conditions. Temperature restrictions may be waived only upon written authorization from Owner's Representative:
 - 1) Ambient temperature is below 45 deg F (7.2 deg C) or will fall below 45 deg F (7.2 deg C) during placement.
 - 2) Temperature of aggregate base below 50 deg F (10 deg C).
 - 3) Presence of free surface water or weather is unsuitable.

- 4) Over-saturated aggregate base and subgrade materials.
- 5) Wind or ground cools mix material before compaction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aggregate Base:
1. Road Base type gravel or crushed stone, graded as follows:

a. Sieve		Percent of Weight Passing
1) 1 inch	(25.4 mm)	100
2) 3/4 inch	(19.0 mm)	85 - 100
3) No. 4	(4.750 mm)	45 - 60
4) No. 10	(2.000 mm)	30 - 50
5) No. 200	(0.075 mm)	5 - 10 (non-plastic)
- B. Asphaltic Paving Patch:
1. Install new asphalt that conforms to the state's Department of Transportation (DOT) requirements adapted to the area of the project

PART 3 - EXECUTION

3.1 PREPARATION

- A. Owner Responsibilities:
1. Remove Scout Trailer(s) if needed.

3.2 PERFORMANCE

- A. Repair Of Deteriorated Areas:
1. Cut edges of pavement in rectangular shape and for **1 foot (300 mm)** minimum beyond damaged material. Make vertical cuts using pavement saw or cold planer.
 2. Subgrade:
 - a. Repair and recompact damaged subgrades.
 3. Aggregate Base:
 - a. Remove and replace damaged aggregate base and sub-grade. Aggregate base is to be at least **6 inches (150 mm)** thick when compacted.
 - b. Compact to ninety five (95) percent minimum density as determined by ASTM D1557.
 - c. Finished aggregate base course shall be true to line and grade within plus or minus **1/4 inch in 10 feet (6 mm in 3 000 mm)**.
 4. Apply tack coat to vertical edges of existing asphalt and curbs.
 5. Asphalt Paving Patch:
 - a. Place full depth patch to match thickness of existing asphalt paving but not less than **3 inches (76 mm)**, at temperatures between **250 and 325 deg F (121 and 163 deg C)**.
 - b. Longitudinal bituminous joints shall be vertical and properly tack coated if cold. Transverse joints shall always be tack coated.
 - c. Compaction:
 - 1) Compact paving to ninety four (94) percent plus three (3) percent minus two (2) percent of theoretical maximum specific gravity.
 - 2) Roll with powered equipment capable of obtaining specified density. Vibratory plate compactor may be used for areas too small for large power equipment.
 - 3) Begin breakdown rolling immediately after asphalt is placed when asphalt temperature is at maximum. Complete breakdown rolling before mix temperature drops below **240 deg F (116 deg C)**. Complete handwork compaction concurrently with breakdown rolling.

- 4) Complete intermediate rolling as soon as possible after breakdown rolling and before mix temperature drops below **185 deg F (85 deg C)**. Do not roll paving for compaction purposes after asphalt temperature falls below **185 deg F (85 deg C)**.
- 5) Execute compaction so visibility of joints is minimized. Complete finish rolling to improve asphalt surface as soon as possible after intermediate rolling and while asphalt paving is still warm. Do not use vibration for finish rolling.
6. Lift Thickness:
 - a. Preferred Method:
 - 1) For pavements **3-1/2 inch (89 mm)** or thinner apply asphalt paving in single lift.
 - 2) For pavements greater than **3-1/2 inch (89 mm)**, use alternate method below.
 - b. Alternate Method:
 - 1) Asphalt paving may be applied in two (2) lifts, first **2 inches (50 mm)** thick minimum and second **1 1/2 inches (38 mm)** thick minimum following temperature recommendations of following paragraph.
 - 2) Surface of first lift shall be clean and provide tack coat between first and second lifts.
 - 3) Provide not less than 2 times maximum aggregate size in compacted asphalt concrete mixes.
 - c. Surface shall be uniform with no 'birdbaths'. Leave finished surfaces clean and smooth. Variations from specified grades shall not exceed **1/2 inch (13 mm)**.

3.3 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
 1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
 - a. Quality Control is sole responsibility of Contractor:
 - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
 - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
 - b. Provide copies of test reports as required in Section 01 4523 'Testing And Inspection Services' of Division 01 'General Requirements'.
 2. Aggregate Base:
 - a. Testing Agency shall provide testing and inspection for exterior aggregate base.
 - b. Number of tests may vary at discretion of Architect.
 - c. 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:
 - d. Sitework Areas: One (1) test for every **10,000 sq. ft. (930 sq. m)** or less of exterior pads area but no fewer than three (3) tests.
 3. Asphalt Paving Patch:
 - a. Testing Agency shall provide full time nuclear density testing and inspection for asphalt paving during asphalt paving operations.
 - b. Inspection to include:
 - 1) Aggregate coating.
 - 2) Asphalt content.
 - 3) Compaction control and effort required.
 - 4) Gradation.
 - 5) Suitability of spreading and paving equipment.
 - 6) Temperature of mix as delivered and placed.
 - c. Field Tests: When tested with **10 foot (3 meter)** straight edge, surface of completed work shall not contain irregularities in excess of **1/4 inch (6 mm)**.
 - 1) Provide nuclear density testing of asphalt paving at a minimum rate of one (1) per **10,000 sq. ft. (930 sq. m)**. Minimum of three (3) tests required.

3.4 CLEANING

- A. General:
 1. Upon completion of repair operations, clean up and remove debris.

END OF SECTION

DIVISION 33: UTILITIES

33 4000 STORM DRAINAGE UTILITIES

33 4116 SITE STORM UTILITY DRAINAGE PIPING

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SECTION 33 4116**SITE STORM UTILITY DRAINAGE PIPING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Perform excavating and backfilling required for work of this Section.
 - 2. Furnish and install storm drainage system using concrete pipe or PVC Polyethylene Pipe and fittings as described in Contract Documents from point of water collection to terminating point.
- B. Related Requirements:
 - 1. Section 31 2316: 'Excavation' for criteria for performance of excavation.
 - 2. Section 31 2323: 'Fill' for criteria for performance of backfill and compaction.

1.2 REFERENCES

- A. Reference Standards:
 - 1. American Association Of State Highway And Transportation Officials:
 - a. AASHTO M 252-18, 'Standard Specification for Corrugated Polyethylene Drainage Pipe'.
 - b. AASHTO M 294-18 'Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter'.
 - 2. ASTM International:
 - a. ASTM A74-17, 'Standard Specification for Cast Iron Soil Pipe and Fittings'.
 - b. ASTM A536-84(2014), 'Standard Specification for Ductile Iron Castings'.
 - c. ASTM A929/A929M-18, 'Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe'.
 - d. ASTM C14-15a, 'Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe'.
 - e. ASTM C14M-15a, 'Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe (Metric)'.
 - f. ASTM C76-19, 'Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe'.
 - g. ASTM C564-14, 'Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings'.
 - h. ASTM D2321-18, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'.
 - i. ASTM D3034-16, 'Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings'.
 - j. ASTM D3212-07(2013), 'Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals'.
 - k. ASTM F794-03(2014), 'Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter'.
 - l. ASTM F1336-15, 'Standard Specification for Poly (Vinyl Chloride) (PVC) Gasketed Sewer Fittings'.
 - 3. Cast Iron Soil Pipe Institute:
 - a. CISPI 301-12, 'Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications'.
 - b. CISPI 310-12, 'Standard Specification for Couplings for use in connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications'.
 - c. CISPI Handbook. 'Cast Iron Soil Pipe and Fittings Handbook' (2006).
 - 4. International Code Council:
 - a. ICC IPC, '2015 International Plumbing Code'.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Materials:

1. Bedding Material: **3/8 inch (9.5 mm)** crushed gravel.
2. Catch Basins, Curb Inlets, Etc:
 - a. Concrete:
 - 1) Construct of **5000 psi (34.47 MPa)** minimum concrete.
 - 2) Include cover inlet with cast iron frame and grate as shown on Drawings.
 - b. PVC:
 - 1) Comply with requirements of ASTM D3212, ASTM F794, and ASTM F1336.
 - 2) Metal grates, Frames, and hoods shall comply with ASTM A536, Grade 70-50-05.
 - 3) Type One Acceptable Products:
 - a) Nyloplast-ADS, Buford, GA (866) 888-8479. www.nyloplast-us.com.
 - b) Equal as approved by Architect before bidding. See Section 01 6200.
3. Concrete Pipe:
 - a. Non-Reinforced: Meet requirements of ASTM C14 or ASTM C14M.
 - b. Reinforced:
 - 1) Meet requirements of ASTM C76, plain end.
 - 2) Determine class of pipe by depth of cover over pipe at rough-graded elevations as follows:

a) Depth Of Cover	Class Of Pipe
b) Under 2 feet	V
c) 2 feet to 3	IV
d) 3 feet to 6 feet	III
e) Over 6 feet	II
 - 3) Determine class of pipe by depth of cover over pipe at rough-graded elevations as follows:

a) Depth Of Cover	Class Of Pipe
b) Under 0.610 m	V
c) 0.610 to 0.915 m	IV
d) 0.915 to 1.800 m	III
e) Over 1.800 m	II
4. PVC Pipe And Fittings:
 - a. Meet requirements of ASTM D3034, SDR 35.
 - b. Fittings: Slip Joint type with elastomeric seals.
5. Fittings: Slip Joint type with elastomeric seals.
6. Corrugated Polyethylene Pipe And Fittings:
 - a. Meet requirements of AASHTO M 252 or AASHTO M 294, Type S.
 - 1) Corrugated, helical or annular, exterior with smooth interior and gasketed connectors.
 - 2) Corrugated, annular, with silt and watertight joints for storm sewers.
7. Corrugated Metal Pipe:
 - a. Meet requirements of ASTM A929/A929M.
 - b. **16-ga (1.6 mm)**, standard round, galvanized with **2 oz (56.7 g)** zinc per **sq ft (0.0929 sq m)** sheet steel.
 - c. Corrugations:
 - 1) **6 to 10 Inch (150 to 255 mm)** Pipe: **1-1/2 by 1/4 inch (38 by 6 mm)** depth helical corrugations.
 - 2) **12 to 60 Inch (300 to 1 500 mm)** Pipe: **2-2/3 by 1/2 inch (17 by 12.7 mm)** depth helical corrugations.
8. Cast Iron Soil Pipe And Fittings:
 - a. Meet requirements of ASTM A74.
 - b. Joint Material: Rubber gaskets meeting requirements of ASTM C564 and compatible with pipe used.
9. Subsurface Stormwater Management.
 - a. Manufacturers:
 - 1) Pipe Systems for use in non-pressure gravity flow storm water collection systems utilizing continuous outfall structure.
 - 2) Type One Acceptable Systems:

- a) Landmax Storm Water Management System, Hancor (Retention/Detention)
Hancor, Inc. www.hancor.com.
- b) Equal as approved by Architect before bidding. See Section 01 6200.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Excavate and backfill as specified in Section 31 2316 and Section 31 2323 with following additional requirements:
 - 1. Runs shall be as close as possible to those shown on Contract Documents.
 - 2. Excavate to required depth.
 - 3. Grade to obtain fall required.
 - 4. Remove debris from trench before laying bedding and pipe.
 - 5. Do not cut trenches near footings without consulting Architect.
 - 6. Backfill only after pipe lines have been tested, inspected, and approved by Architect/Engineer.

3.2 INSTALLATION

- A. Concrete Pipe:
 - 1. Provide **3 inches (75 mm)** of uncompacted bedding material below pipe.
 - 2. After installation of pipe, provide additional bedding material up to springline of pipe.
- B. PVC / Polyethylene Pipe:
 - 1. Install in accordance with ASTM D2321.
 - 2. Minimum cover for corrugated polyethylene pipe and fittings shall be **12 inches (300 mm)** for H-20 load.
- C. Use jacks to make-up gasketed joints.

3.3 FIELD QUALITY CONTROL

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

3.4 CLEANING

- A. Remove excess earth from site or place as directed by Architect.

END OF SECTION

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