PROJECT MANUAL

DATE: DECEMBER 2025

South Ogden Utah Stake LURC
UTAH SOUTH OGDEN FM OFFICE
RETAINING WALL REPLACEMENT
4320 ORCHARD AVENUE
OGDEN, UTAH

PROJECT NUMBER: 513821325010101

McNEIL ENGINEERING™
Economic and Sustainable Designs, Professionals You Know and Trust
8610 South Sandy Parkway, Suite 200 Sandy, Utah 84070 801.255.7700 mcneilengineering.com

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SECTION 00 0110

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END OF SECTION

BIDDING REQUIREMENTS

FIXED SUM PROJECT (U.S.)

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INVITATION TO BID (U.S.)

1. GENERAL CONTRACTORS INVITED TO BID THE PROJECT:

Hall Construction
Saunders Construction
RAM Construction
Painter Construction

2. PROJECT:

Replace Retaining Wall
Retainint Wall

3. LOCATION:

4380 Orchard Ave.
Ogden, UT 84403

4. OWNER:

The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole
c/o
South Ogden FM Group - Shad Hales

5. CONSULTANT:

McNeil Engineering

6. DESCRIPTION OF PROJECT:

A. Replace existing, failing concrete retaining wall and restore existing site conditions

B. Products or systems may be provided through relationships the Owner has negotiated with suppliers as indicated 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: Bids will be received by Owners preferred method at 12/12/2025 at 10:30 a.m. to be announced. Bids will be publicly opened at 12/12/2025 at 10:30 a.m. to be announced.

10. BIDDING DOCUMENTS:

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

1) ConsLog

2)

3)

4)

B. Bidding Documents may be obtained from the Architect.

C. Bidding Documents may be obtained from Owner’s electronic bidding tool.

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

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

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

END OF DOCUMENT

INSTRUCTIONS TO BIDDERS (U.S.)

1. DEFINITIONS:

A. The definitions set forth in Section 1 of the General Conditions are applicable to the documents included under Bidding Requirements.

B. Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The proposed Contract Documents consist of the documents identified as Contract Documents in the Form of Agreement, except for Modifications. The Bidding Requirements are those documents identified as such in the proposed Project Manual.

C. Addenda are written, or graphic documents issued by the Architect prior to execution of the Contract which modify or interpret the Bidding Documents. They become part of the Contract Documents as noted in the Form of Agreement upon execution of the Contract.

2. BIDDER'S REPRESENTATIONS:

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

3. BIDDING DOCUMENTS:

A. Copies
   1) Bidding Documents may be obtained as set forth in the Invitation to Bid.
   2) Partial sets of Bidding Documents will not be issued.
   3) Bidders will use complete sets of Bidding Documents in preparing bids and make certain that those submitting sub-bids to them have access to all portions of the documents that pertain to the work covered by sub-bid, including General Conditions, Supplementary Conditions, and Division 01. Bidder assumes full responsibility for errors or misinterpretations resulting from use of partial sets of Bidding Documents by itself or any sub-bidder.

B. Interpretation or Correction of Bidding Documents
   1) Bidders will request interpretation or correction of any apparent errors, discrepancies, and omissions in the Bidding Documents.
   2) Corrections or changes to Bidding Documents will be made by written addenda.

C. Substitutions and Equal Products
   1) Generally speaking, substitutions for specified products and systems, as defined in the Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
   2) The terms *'Acceptable Manufacturers', 'Approved Manufacturers 'Suppliers', Installers'* and *'VMR (Value Managed Relationship) Manufacturers / Suppliers / Installers'* are used throughout the Project Manual to differentiate among the options available to Contractor regarding specified products, manufacturers, and suppliers. See Section 016000 for options available regarding acceptance of equal products.
   3) Base bid only on materials, equipment, systems, suppliers or performance qualities specified in the Bidding Documents.

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

D. Addenda - Addenda will be sent to bidders and to locations where Bidding Documents are on file no later than 2 business days prior to bid opening.

4. BIDDING PROCEDURES:

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

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

C. Submission of Bids
1) Follow the instructions in the Owner's bidding tool when submitting your bid.
2) It is bidder's sole responsibility to see that its bid is received at specified time.
3) No oral, facsimile transmitted, telegraphic, or telephonic bids, modifications, or cancellations will be considered.

D. Modification or Withdrawal of Bid
1) Bidder guarantees there will be no revisions or withdrawal of bid amount for 45 days after bid opening.
2) Prior to bid opening, bidders may withdraw bid from Owner's bidding tool.

5. CONSIDERATION OF BIDS:

A. Opening of Bids - See Invitation to Bid.

B. Rejection of Bids - Owner reserves right to reject any or all bids and to waive any irregularity therein.

C. Acceptance of Bid
1) No bidder will consider itself under contract after opening and reading of bids until Agreement between Owner and Contractor is fully executed.
2) Bidder's past performance, organization, subcontractor selection, equipment, and ability to perform and complete its contract in manner and within time specified,

together with amount of bid, will be elements considered in award of contract.

6. POST-BID INFORMATION:

A. The conditionally accepted bidder submitting a bid involving subcontractors will submit its list of proposed subcontractors within 24 hours after bid opening.

7. PERFORMANCE BOND AND PAYMENT BOND:

A. Bond Requirements - Performance Bond and Labor and Material Payment bond may be required for this Project as specified in the General Conditions.

B. Time of Delivery of Bonds - Bonds will be delivered to Owner with Agreement signed by bidder.

8. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:

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

9. MISCELLANEOUS:

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

B. Liquidated Damages - Conditions governing liquidated damages are specified in the General Conditions and in the Supplementary Conditions.

C. Examination Schedule for Existing Building and Site
   1) Arrange access to the interior of the meething house with the facility manager directly.

D. Exemption from local taxes - See Supplementary Conditions

END OF DOCUMENT

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SUBCONTRACTORS AND MAJOR MATERIALS SUPPLIERS LIST

Project Name: _____ Date:_____

Stake: _____ Project No: _____

General Contractor: _____

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

VMR SUBCONTRACTORS

Roofing _____

Doors, Frames & Hardware _____

Storefronts _____

Wood Flooring _____

Other _____

Other _____

SUBCONTRACTORS AND SUPPLIERS

Grading / Site work _____

Site Utilities _____

Demolition _____

Paving _____

Termite Control _____

Site Concrete _____

Fencing _____

Irrigation System _____

Landscaping _____

Building Concrete _____

Masonry _____

Structural Steel _____

Framing _____

Trusses _____

Insulation _____

EIFS _____

Soffit / Fascia _____

Steeple _____

Millwork _____

Drywall _____

Ceramic Tile _____

Acoustical Tile _____

Painting _____

Wall Coverings _____

Elevators / Lifts _____

Draperies _____

Fire Sprinklers _____

Plumbing _____

HVAC _____

Electrical _____

Controls _____

Sound / Satellite _____

EQUAL PRODUCT APPROVAL REQUEST FORM (U.S.)

Project Name: _____ Request Number: _____

TO: _____

FROM: _____

BID DATE: _____

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

PROPOSED EQUAL PRODUCT:

Specification Section: _____

Specified Products: _____

Proposed Product: _____

The Undersigned certifies:

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

ATTACHMENTS:

Include the following attachments -

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

SIGNED: _____

Printed Name _____

Company _____

Address _____

City, State, Zip Code _____

Telephone _____ Fax _____

REVIEW COMMENTS:

_____ Accepted. See Addenda Number _____.

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

_____ Proposed equal product not acceptable. Use specified products.

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

ADDITIONAL COMMENTS:

BY: _____ **DATE:** _____

CONSTRUCTION MATERIAL ASBESTOS STATEMENT (U.S.)

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

Building Name: South Ogden UT STK-LURC

Building Plan Type:

Building Address: 4380 Orchard Ave., Ogden, UT 84403

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

Project Number: 513821325010101

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

SUPPLEMENTARY CONDITIONS

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

ITEM 1 - GENERAL

1. Conditions of the Small Project Agreement Between Owner and Contractor (U.S.) apply to each Division of the Specifications.

2. Provisions contained in Division 01 apply to all Divisions of the Specifications.

ITEM 2 - LIQUIDATED DAMAGES PAYABLE TO OWNER

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

Delay in Completion of the Work. For each day after the expiration of the designated Time of Completion that Contractor has not completed the Work, Contractor will pay Owner the amount of Two Hundred Fifty dollars ($250.00) 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. <u>Payment</u>

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

SECTION 01 1000

SUMMARY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Summary of Work.

B. Work restrictions.

C. Owner-furnished materials.

D. Management of multiple contracts.

1.02 PROJECT

A. Project Name: Oak Hills 1, 7 Landscape & Site Improvements

B. Owner's Name: Provo Utah Oak Hills Stake

C. Landscape Architect's Name: McNeil Engineering

D. The Project consists of the construction of landscape and irrigation improvements and opening up access to existing dry-well sumps in the parking areas.

1.03 WORK COVERED BY CONTRACT DOCUMENTS

A. Provisions contained in Division 01 apply to Sections of Divisions 02 through 49 of Specifications. Instructions contained in Specifications are directed to Contractor. Unless specifically provided otherwise, obligations set forth in Contract Documents are obligations of Contractor

B. Contractor shall furnish total labor, materials, equipment, and services necessary to perform The Work in accordance with Contract Documents.

1.04 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price unless directed differently by owners representative.

1.05 WORK BY OWNER

A. Owner will furnish and install some portions of The Work with its own forces. Contractor will be provided with schedule of when these items are to be performed.
   1. General:
      a. Complete work necessary to accommodate work to be performed by Owner before scheduled date for performance of such work. Contractor will be back charged for actual expenses incurred by Owner for failure to timely complete such work.
      b. Store and protect completed work provided by Owner until date of Substantial Completion.

1.06 ADMINISTRATIVE REQUIREMENTS

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

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

C. Review 'Contractor Notice of Owner Furnished Materials' notice listing Owner-furnished products to be delivered for Project:
   1. Review due (delivery) dates and vendor lead times for each item and coordinate with construction schedule. Immediately report recommended changes to Owner's Purchasing

Coordinator listed in 'Contractor Notice of Owner Furnished Materials'. Contact vendors directly if changes to delivery dates become necessary during construction.

2. Report problems in coordinating due (delivery) dates with construction schedule to Architect and Owner's Purchasing Coordinator.

D. Receive unload, store and properly protect Owner-furnished materials and products.
   1. Provide labor and equipment necessary to receive, unload, and store materials and products.
   2. Count number of pieces received and note any discrepancies on Delivery Receipt before driver leaves:
   3. Include Project Name and Project Number on Delivery Receipt.
   4. Check for visible evidence of damage such as holes, tears, or crushed portions of cartons and note on Delivery Receipt before driver leaves:
      a. If you are unsure if carton is damaged, take photo of cartons and share it with Owner's Purchasing Coordinator.

E. Within forty-eight (48) hours of delivery:
   1. Open and inspect each piece of freight delivered. Take picture of any concealed damage not reported at time of delivery and report it to Owner's Purchasing Coordinator.
   2. Compare 'Contractor Notice of Owner Furnished Materials' with packing slips. Note discrepancies in number, size, color, model numbers, etc.
   3. Deliver copy of Delivery Receipt (bill of lading) on which you have noted any loss or damage to Owner's Purchasing Coordinator. Include in your submission any report of concealed damage, discrepancies or photos.

F. Failure to strictly follow above procedures will result in Contractor's assumption of all financial responsibility for this shipment. All replacement and reorders must be made through Owner's Purchasing Coordinator and must allow Owner's vendor sufficient lead time to produce and ship new product.

G. When above procedures are strictly followed, shortages and damaged items will be replaced by Owner at Owner's cost.

1.07 OWNER OCCUPANCY

A. Owner will occupy the Project site during Construction.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

1.08 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations:
   1. Locate and conduct construction activities in ways that will limit disturbance to site.

B. Contractor will ensure that Contractor, its employees, subcontractors, and their employees comply with following requirements:
   1. Do not use or consume alcohol or cannabis, or illegal use drugs, on the Project Site or enter on or perform any Work on the Project Site while under their influence.
   2. Do not smoke or vape anything on the Project Site. Do not use tobacco in any form on the Project Site.
   3. Do not perform Work on the Project Site on Sundays except for emergency work.
   4. Refrain from using profanity or being discourteous or uncivil to others on the Project Site or while performing Work under this Agreement.
   5. Do not view or allow pornographic or other indecent materials on the Project Site.
   6. Do not play obnoxious and/or loud music on the Project Site. Do not play any music within existing facilities.
   7. Refrain from wearing immodest, offensive, or obnoxious clothing, while on the Project Site.
   8. Do not bring weapons on the Project Site.

C. Existing building spaces may not be used for storage.

D. Do not load or permit any part of the structure to be loaded with a weight that will endanger its safety. Questions of structural loading as part of construction means and methods shall be addressed by a licensed structural engineer engaged by Contractor, subject to the review by Architect.

1.09 MULTIPLE CONTRACT SUMMARY

A. Owner may issue separate contracts for operations scheduled to precede and be substantially completed before beginning of The Work under this Contract.
   1. Contractor will be given written notice from such contractors of any revisions to scheduled completion of their work at least 30 days in advance. Owner will reimburse Contractor for expenses incurred by Contractor by failure to be properly notified.

B. Owner has issued or will issue separate contracts for operations scheduled to be completed between Notice to Proceed and Substantial Completion.
   1. General:
      a. Schedule performance of work covered by such separate contracts in Contractor's Construction Schedule so as to avoid delays in Substantial Completion. Give written notice to such contractors and to Owner of any revisions to scheduled delivery and work dates at least 90 days in advance.
      b. Complete work necessary to accommodate items provided under such separate contracts before scheduled date for performance of such work. Contractor will be back charged for actual expenses incurred by Owner for failure to timely complete such work including, but not limited to, cost of crews during downtime or for call backs and costs to correct substrate deficiencies.
      c. Store and protect completed work provided under separate contracts until date of Substantial Completion.

C. Owner has issued or will issue separate contracts for operations normally scheduled to follow Substantial Completion.
   1. General:
      a. Give written notice to such contractors and to Owner of any revisions of scheduled date of Substantial Completion at least 90 days in advance. Contractor will be back charged for actual expenses incurred by Owner for failure to accurately report date of Substantial Completion.
      b. Complete work necessary to accommodate items provided under such separate contracts before Substantial Completion. Contractor will be back charged for actual expenses incurred by Owner for failure to complete such work before Substantial Completion.
   2. Separate contracts issued by Owner
      a. See section 1.05, B in this section for a list of products installed under separate contracts.

1.10 MULTIPLE CONTRACT COORDINATION

A. Contractor shall be responsible for accurately maintaining and reporting schedule of The Work from Notice to Proceed to date of Substantial Completion.

B. Contractor shall be responsible for providing Temporary Facilities And Controls for those who perform work on Project from Notice to Proceed to date of Substantial Completion.

C. Contractor shall be responsible for providing Construction Waste Management And Disposal services for those who perform work on Project from Notice to Proceed to date of Substantial Completion.

D. Contractor shall be responsible for Final Cleaning for entire Project.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 1000

SECTION 01 7800

CLOSEOUT SUBMITTALS

PART 1 GENERAL

SECTION 02. 1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

D. Maintenance materials.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. Individual Product Sections: Warranties required for specific products or Work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 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 Architect's reference during normal working hours.

B. Maintain clean, undamaged set of Drawings:
   1. Mark set to show actual installation where installation varies from the Work as originally shown.
   2. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
   3. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
   4. Mark new information that is important to Owner, but was not shown on Drawings.
   5. Note related Change Order numbers where applicable.

C. As Built Record Drawings:
   1. As required in agreement with the Owner:
      a. Architect will provide two full-size sets of prints of the As Built Record Drawings to the Facilities Management Office, printed from the updated AutoCAD drawing files or updated Revit model files, as specified by Owner, that have been modified to show actual dimensions and location of equipment, material, utility lines, and other work as actually constructed, based upon information provided by Contractor. Architect will submit updated As Built Record Drawings in PDF (ISO32000 format) to Owner.
      b. Architect will submit following:
         1) Updated AutoCAD as built record drawing files with associated plot style tables or Revit as built record model files, as specified by Owner.
         2) Revit Model O&M lifecycle requirements to be tracked by Facility Manager.

D. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.

2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed shop drawings, product data, and samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

E. Ensure entries are complete and accurate, enabling future reference by Owner.

F. Store record documents separate from documents used for construction.

G. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

3.02 OPERATION AND MAINTENANCE DATA

H. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

I. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

J. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

K. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

L. General:
1. Include closeout submittal documentation as required by Contract Documentation.
2. Include workmanship bonds, final certifications, equipment check-out sheets, and similar documents.
3. Releases enabling Owner unrestricted use of The Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
4. Include Project photographs, damage or settlement survey, and similar record information required by Contract Documents.
5. Submittal Format:
   a. Digital copies unless otherwise noted, required for each individual specification section that include ‘Closeout Submittals’.
   b. Include only closeout submittals as defined in individual specification section as required in Contract Documents.

M. Project Manual:
1. Copy of complete Project Manual including Addenda, Modifications as defined in General Conditions, and other interpretations issued during construction:
   a. Mark these documents to show variations in actual Work performed in comparison with text of specifications and Modifications.
   b. Show substitutions, selection of options, and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.

N. Maintenance Contracts:
1. Digital format only.

O. Operations and Maintenance Data:
1. Digital format only:
   a. Cleaning instructions.
   b. Maintenance instructions.
   c. Operations instructions.

d. Equipment list.
e. Parts list.

P. Warranty Documentation:
1. Digital format of final, executed warranties.

Q. Record Documentation:
1. Digital format only.
a. Certificate of Occupancy
b. Certifications.
c. Color and pattern selections
d. Design Data.
e. Geotechnical Evaluation Reports (soils reports).
f. Manufacture Reports.
g. Manufacturer's literature or cut sheets.
h. Shop Drawings.
i. Source Quality Control.
j. Special Procedures.

R. Testing and Inspection Agency Reports.
1. Testing and Inspection Reports.

S. Software:
1. Audio and Video System software, programming and set-files.

T. Irrigation Plan.
1. Laminated and un-laminated reduced sized hard copies.

U. Landscape Management Plan (LMP):
1. Irrigation Section:
a. Submittal Format: Digital format and hard copy of each.
b. Documentation required by sections under 32 8000 Heading: ‘Irrigation’.
2. Landscaping Section:
a. Submittal Format: Digital format and hard copy of each.
b. Documentation required by sections under 32 9000 Heading: ‘Planting’.

3.03 WARRANTIES AND BONDS

V. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

W. Verify that documents are in proper form, contain full information, and are notarized.

X. Co-execute submittals when required.

Y. Retain warranties and bonds until time specified for submittal.

Z. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

AA. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers. Provide copy of electronic manual as requested by owner.

BB. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

CC. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

DD. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor,

supplier, and manufacturer, with name, address, and telephone number of responsible principal.

3.04 MAINTENANCE MATERIAL SUBMITTALS

EE. Submit item(s) required by Section 01 3000 - Administrative Requirements and as defined in individual specification sections if required in Contract Documents. Items may be provided at completion of Work or with Closeout Submittals.

END OF SECTION

SECTION 02 4113

SELECTIVE SITE DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

A. Includes But Not Limited To:
   1. Demolish and remove portions of existing site facilities as described in Contract Documents.

B. Related Requirements:
   1. New and replacement work specified in appropriate specification Sections.

1.02 ADMINISTRATIVE REQUIREMENTS

C. Scheduling:
   1. Include on Construction Schedule detailed sequence of individual site demolition operations.

1.03 SUBMITTALS

D. Closeout Submittals:
   1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
      a. Record Documentation:
         1) Identify abandoned utility and service lines and capping locations on record drawings.

PART 2 PRODUCTS: NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

3.02 PREPARATION

A. Notify corporations, companies, individuals, and local authorities owning conduits running to property.
   1. Protect and maintain conduits, drains, sewers, pipes, and wires that are to remain on the property.
   2. Arrange for removal of wires running to and on property. Remove pipes and sewers in accordance with instructions of above owners.

3.03 PERFORMANCE

B. Execute work in orderly and careful manner, with due consideration for neighbors and the public.

C. Carefully remove, disassemble, or dismantle as required, and store in approved location on site, existing items to be reused in completed work. Coordinate with Owner for equipment and materials to be removed by Owner.

D. Concrete And Paving Removal:
   1. Saw cut joints between material to be removed and material to remain to full depth.
   2. Hand-excavate trench 12 inches (300 mm) wide and 16 inches (400 mm) deep along concrete or paving to be removed. Cut roots encountered with saw, axe, or pruner. Do not cut roots with excavating equipment. Remove roots under concrete and paving to be replaced down to 12 inches (300 mm) below finish grade.

3.04 CLEANING

E. Keep streets and roads reasonably clean and sweep daily.

F. Sprinkle demolition rubbish and debris as necessary to lay dust.

G. Promptly remove demolition materials, rubbish, and debris from property.

END OF SECTION 02 4113

SECTION 03 3000

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.

B. Concrete anchors

C. Concrete reinforcement.

D. Joint devices associated with concrete work.

E. Miscellaneous concrete elements, including equipment pads, equipment pits, light pole bases, flagpole bases, thrust blocks, and manholes.

F. Concrete curing.

1.02 RELATED REQUIREMENTS

A. Section 03 3517 - Concrete Sealer Finishing

B. Section 07 9200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

1.03 REFERENCE STANDARDS

A. ACI 117 - Specification for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).

B. ACI 211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide 2022.

C. ACI 301 - Specifications for Concrete Construction 2020.

D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).

E. ACI 305R - Guide to Hot Weather Concreting 2020.

F. ACI 306R - Guide to Cold Weather Concreting 2016.

G. ACI 308R - Guide to External Curing of Concrete 2016.

H. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).

I. ACI 347R - Guide to Formwork for Concrete 2014 (Reapproved 2021).

J. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished 2018.

K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.

L. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars 2022.

M. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement 2014.

N. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.

O. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation 2017.

P. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.

Q. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2021.

R. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.

S. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete 2020.

T. ASTM C150/C150M - Standard Specification for Portland Cement 2022.

U. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete 2020.

V. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method 2016.

W. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2022.

X. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing 2017.

Y. ASTM C779/C779M - Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces 2019.

Z. ASTM C827/C827M - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures 2016.

AA. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete 2021.

BB. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2020.

CC. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures 2020.

DD. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete 2019.

EE. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.

FF. ASTM D471 - Standard Test Method for Rubber Property--Effect of Liquids 2016a (Reapproved 2021).

GG. ASTM D523 - Standard Test Method for Specular Gloss 2014 (Reapproved 2018).

HH. ASTM D994/D994M - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type) 2011 (Reapproved 2022).

II. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting 2015.

JJ. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars 2021.

KK. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a.

LL. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2021.

MM. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength 2020.

NN. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2022.

OO. COE CRD-C 48 - Handbook for Concrete and Cement Standard Test Method for Water Permeability of Concrete 1992.

PP. COE CRD-C 513 - Handbook for Concrete and Cement Corps of Engineers Specifications for Rubber Waterstops 1974.

QQ. COE CRD-C 621 - Handbook for Concrete and Cement Standard Specification for Packaged, Dry 1997.

RR. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements 2015.

SS. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements 2016.

TT. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair 2013.

1.04 SUBMITTALS

A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
   1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
   2. For chemical-resistant waterstops, provide data on ASTM D471 test results.
   3. Printed application instructions for form release agents.

B. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
   2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.

C. Shop Drawings:
   1. Show dimensioned locations of anchor bolts for hold-down anchors and columns.
   2. Show reinforcement and all necessary bending diagrams and reinforcing steel list, and construction joint locations.
   3. Provide bar schedules and bending details.
   4. Show all formwork for concrete surfaces which are to remain exposed in the finished work.
   5. Joint layout plan for control and expansion joints for sidewalks, curbs, and gutters for written approval before starting work on this Section.

D. Samples: Submit samples of underslab vapor retarder to be used.

E. 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 its 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.
   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.

F. Test Reports: Submit report for each test or series of tests specified.

G. Manufacturer's Installation Instructions: For concrete accessories and form release agents, indicate installation procedures and interface required with adjacent construction.

H. Manufacturer’s Reports:
   1. Provide Manufacturer's performance and testing data for following:
      a. Each admixture used.

I. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

J. 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:
               (1) Date and time of start of pour, Date and time of end of pour, and Date and time of end of finishing procedures.
               (2) Temperature at start of pour, Temperature at end of Pour, and Maximum temperature during performance of finishing procedures.
               (3) Wind speed at start of pour, Wind speed at end of pour, and Maximum wind speed during performance of finishing procedures.
               (4) Humidity at start of pour, Humidity at end of pour, and High and low humidity during performance of finishing procedures.
               (5) Cloud cover at start of pour, Cloud cover at end of pour, and High and low cloud cover during performance of finishing procedures.
               (6) Screeding method and equipment used.
               (7) 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.

K. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 DEFINITIONS

A. Cold Weather, as referred to in this Section, is four (4) hours with ambient temperature below 40 deg F in twenty-four (24) hour period.

B. Hot Weather, as referred to in this Section, is ambient air temperature above 100 deg F or ambient air temperature above 90 deg F with wind velocity 8 mph or greater.

1.06 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.
   1. Maintain one copy of each document on site.

C. Qualifications: Requirements of Section 01 4000 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.
      b. Certification for National Ready Mixed Concrete Association (NRMCA).
   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.

D. 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.

E. Follow recommendations of ACI 305R when concreting during hot weather.

F. Follow recommendations of ACI 306R when concreting during cold weather.

G. MANDATORY Pre-Installation Conference:
   1. Agenda items, review following:
      a. Review Section 01 4000 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. Set up concrete placement pour card system and verify that all relevant trades have signed off prior to concrete placement.
      c. Obtaining trade sign-offs on each pour card will be responsibility of General Contactor’s foreman or whoever is in charge of ordering concrete.
      d. Pour cards will be turned in to Quality Assurance representative after the work has been completed so that they can be reviewed and filed.
      e. Review installation scheduling, coordination, placement of building concrete, and placement of items installed in and under concrete.
      f. Review installation scheduling, coordination and placement of site concrete and of items installed in concrete.
      g. Review "Verification of Conditions" requirements.
      h. Review requirements for preparation of subgrade and aggregate base requirements.
      i. Review formwork requirements.
      j. Review approved mix design requirements, mix designs and use of admixtures.
      k. Review reinforcing bar submittals.
      l. Review installation schedule and placement of reinforcing bars.
      m. Review placement, finishing, and curing of concrete, including cold and hot weather requirements.
      n. Review joint layout plan for control and expansion joints, fillers for sidewalks, curbs, and gutters:
         1) Review jointing requirements.
         2) Joint layout for concrete paving is specified in Section 32 1313.
      o. Review smooth rubbed concrete finish procedures and requirements (applied immediately after removing concrete formwork while concrete is "green").

p. Review layout plan, scheduling, coordination, and placement requirements of detectable warning panels.
q. Review concrete slab tolerances and corrective measures if tolerances not met.
r. Review safety issues.

H. Scheduling:
1. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing concrete.
2. Schedule pre-installation conference prior to placing of footings, installation of foundation forms and reinforcing steel, and installation of anchors, dowels, inserts, and block outs in foundation walls and slabs.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 CONCRETE FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
2. Form Facing for Exposed Finish Concrete: Steel.
3. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
a. Vertical earth cuts may be used for footings provided the footing width and length are 6" wider and longer than scheduled.
4. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
5. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 CONCRETE ANCHORS

A. General:
1. Use hot-dipped galvanized or stainless steel with matching nuts and washers in exterior and moist interior applications unless indicated otherwise on Contract Drawings.
a. Install hot-dipped or stainless steel anchor bolts to attach wood sill plates to foundation with standard cut washers. Use 1/4 inch by 3 inch x 3 inch minimum adjustable plate washers and standard cut washers between wood sill plates and nuts for seismic design category 'D' and above.
b. Nut: Conform to requirements of ASTM A563, Grade A, Hex.
c. Conform to requirements of ASTM F3125/F3125M for chemical, physical and mechanical requirements for quenched and tempered bolts manufactured from steel and alloy steel.
6. Threaded rod for adhesive anchors and cast-in anchors:
a. Conform to requirements of ASTM A307, Grade A or ASTM F1554 Grade 36 unless indicated otherwise on Contract Drawings.
7. Cast-In-Place Anchor Bolts:
a. J-Bolts:
1) Non-headed type threaded 2 inches minimum conforming to requirements of ASTM F1554, Grade A.
2) Anchor hook to project 2 inches minimum including bolt diameter.

b. Headed Bolts:
1) Headed type threaded 2 inches minimum conforming to requirements of ASTM F1554, Grade A.

8. Headed Concrete Anchor Studs:
a. Composed of low carbon steel meeting requirements of ASTM A108.
b. Tensile Strength: 61,000 psi minimum.
c. Yield Strength: 49,000 psi minimum.

9. Deformed Bar Anchors:
a. Manufactured in accordance with requirements of ASTM A1064/A1064M.
b. Tensile Strength: 80,000 psi minimum.
c. Yield Strength: 70,000 psi minimum.

10. Reinforcing Bars:
a. Composed of deformed carbon steel meeting requirements of ASTM A615/A615M, Grade 60 (field bent bars may be Grade 40)

11. Adhesive Anchors:
a. Products shall have current ESR conforming to current ICC Acceptance Criteria ICC-ES AC308 for concrete.
b. Rod diameter and embedment length as indicated on Contract Drawings.
c. Acceptable Products:
1) HIT-RE 500V3 with SafeSet Epoxy Adhesive by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
2) Pure 110+ by Powers Fasteners Inc., Brewster NY www.powers.com.
3) SET-XP Epoxy by Simpson Strong-Tie Co., Pleasanton, CA www.simpsonanchors.com.
4) Equal as approved by Architect before installation. See Section 01 6000.

12. Expansion Anchors:
a. Products shall have current ESR conforming to current ICC Acceptance Criteria ICC-ES AC193 for concrete.
b. Acceptable Products:
1) KWIK Bolt TZ Expansion Anchor by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
2) Power-Stud +SD2 by Powers Fasteners Inc., Brewster NY www.powers.com.
3) Strong-Bolt by Simpson Strong-Tie Co., Pleasanton, CA www.simpsonanchors.com.
4) Equal as approved by Architect before installation. See Section 01 6000.

13. Screw Anchors:
a. Provide anchors with length identification markings conforming to ICC Acceptance Criteria ICC-ES AC193 for concrete.
b. Type Two Acceptable Products:
1) KWIK HUS-EZ by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
2) Wedge-Bolt+ by Powers Fasteners Inc., Brewster NY www.powers.com.
3) Titen HD by Simpson Strong Tie Co, Pleasanton, CA www.simpsonanchors.com.
4) Equals as approved by Architect through shop drawing submittal before installation. See Section 01 6000.

2.03 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), except dowels that are to be field bent, Grade 40 minimum.
1. Type: Deformed billet-steel bars.
2. Finish: Unfinished, unless otherwise indicated.
3. Bars shall be free of heavy rust scales and flakes, or other bond-reducing coatings.

B. Epoxy Coated Reinforcement Steel Bars:

1. Bars shall have grade identification marks and conform to ASTM A615/A615M with coating conforming to ASTM A775/A775M and comply with requirements of ACI 318.21.2.5:
    a. Bar supports shall be completely coated with epoxy or vinyl, compatible with both concrete and epoxy coating on bars. Coating shall be at least 1/8 inch thick at tips.
    b. Tie wire shall be nylon coated.
4. Actual yield strength based on mill tests does not exceed specified yield strength by more than 18,000 psi and Ratio of actual ultimate stress (at breaking point) to actual tensile yield stress shall not be less than 1.25.
    a. Grade 60 minimum, except dowels that are to be field bent, Grade 40 minimum.
5. Bars shall be deformed type.
6. Bars shall be free of heavy rust scales and flakes, or other bond-reducing coatings.

C. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.
1. Form: Coiled Rolls.
2. WWR Style: 6 x 6 - W1.4 x W1.4..

D. Reinforcement Accessories:
1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
2. Bar Supports:
    a. Concrete masonry units or bricks are not acceptable.
    b. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CSRI, Class 2).
    c. Acceptable Products:
        1) Concrete 'dobies' or blocks wired to reinforcing.
        2) Manufactured chairs with 4 sq inch 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.
3. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
4. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.04 CONCRETE MATERIALS

A. 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.

B. Cement: ASTM C150/C150M, Type I - Normal Portland type..
1. Acquire cement for entire project from same source.

C. Concrete mix design: Submit mix designs to meet following requirements:
1. Mix Type E:
    a. For exterior concrete exposed to freeze/thaw cycles and deicing salts or where soils are "corrosive" and as otherwise required by the contract drawings.
    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 E 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 coarse aggregate (about 15 percent).

2. Air Entrainment: Six (6) percent, plus or minus 1-1/2 percent for exterior concrete and foundation walls exposed to freeze/thaw cycles.
3. Do not add water any time during mixing cycle above amount required to meet specified water / cement ratio. No reduction in amount of cementitious material is allowed.
4. Mix design stregnths specified are a minimum due to exposure to sulfates, chlorides, freeze/thaw, water, etc. Refer to the structural drawings for additional concrete strength requirements. The most stringent requirements should be met.

D. 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.

E. General:
1. Submit a letter on quarry's letterhead that certifies all aggregate for concrete complies with the requirements of this section. Material certificates which are submitted shall be signed by both the materials producer and the contractor, certifying that materials comply with or exceed requirements specified herein to the Architect, Civil and Structural Engineering Consultant and the Independent Testing Laboratory for review and approval.
2. Aggregates for all concrete shall come from a quarry that is DOT approved and meets or exceeds durability Class I aggregate. The quarry shall submit a letter to Engineer that certifies that all aggregate complies with DOT requirements for durability. Aggregate not meeting DOT durability requirements shall not be used.

F. Fine and Coarse Aggregates: ASTM C33/C33M.
1. Acquire aggregates for entire project from same source.

G. Fly Ash: ASTM C618, Class C or F.
1. Not to exceed twenty-five (25) percent of weight of cementitious materials.

H. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

A. 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.
1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Mix design shall show proposed admixtures, amount, usage instructions, and justification for proposed use. Do not use any admixtures without Architect's written approval.
1. Chemical accelerator or retarder may be used if necessary to meet environmental conditions and construction schedules.

C. Alkali-Silica Reactivity Inhibiting Admixture:
1. Specially formulated lithium nitrate admixture for prevention of alkali-silica reactivity (ASR) in concrete. Admixture must have test data indicating conformance to ASTM C1293.
2. Manufacturer: As approved by Architect before use. See Section 01 6000.

D. Viscosity Modifying Admixture (VMA):
1. Liquid admixture used to optimize viscosity of Self-Consolidating Concrete (SCC). Subject to compliance with requirements, provide following at dosage rates per manufacturer's recommendations.
2. Manufacturer: As approved by Architect before use. See Section 01 6000.

E. Air Entraining Admixture: ASTM C260/C260M.
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

F. High Range Water Reducing Admixture: ASTM C494/C494 Type F.
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

G. High Range Water Reducing and Retarding Admixture (Superplasticizer): ASTM C494/C494M Type G.
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

H. Water Reducing Admixture: ASTM C494/C494M Type A.
   1. Manufacturer: As approved by Architect before use. See Section 01 6000.

I. Water Reducing and Accelerating Admixture: ASTM C494/C494 Type E.
   1. Manufacturer: As approved by Architect before use. See Section 01 6000.

J. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D
   1. Manufacturer: As approved by Architect before use. See Section 01 6000.

K. Accelerating Admixture: ASTM C494/C494M Type C.
   1. Manufacturer: As approved by Architect before use. See Section 01 6000.

L. Retarding Admixture: ASTM C494/C494M Type B.
   1. Manufacturer: As approved by Architect before use. See Section 01 6000.

M. Shrinkage Reducing Admixture: ASTM C494/C494M Type S.
   1. Manufacturer: As approved by Architect before use. See Section 01 6000.

N. Non-Chloride, Non-Corrosive Accelerating Admixture: ASTM C494/C494M Type C or E.
   1. Manufacturer: As approved by Architect before use. See Section 01 6000.

O. Corrosion Inhibiting Admixture: ASTM C494/C494M Type C and ASTM C1582/C1582M.
   1. 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.
   2. Manufacturer: As approved by Architect before use. See Section 01 6000.

P. Moisture Vapor Reduction Admixture (MVRA):
   1. Liquid, inorganic admixture free of volatile organic compounds (VOCs) and formulated to close capillary systems formed during curing to reduce moisture vapor emission and transmission with no adverse effect on concrete properties or finish flooring.
   2. Manufacturer: As approved by Architect before use. See Section 01 6000.

Q. Waterproofing Admixture:
   1. Admixture formulated to reduce permeability to liquid water, with no adverse effect on concrete properties.
   2. Admixture Composition: Crystalline, functioning by growth of crystals in capillary pores.
   3. Admixture Composition: Hydrophobic polymer waterproofing and corrosion inhibitor, functioning by closing concrete pores and chemical bonding.
   4. Permeability of Cured Concrete: No measurable leakage when tested in accordance with COE CRD-C 48 at 200 psi; provide test reports.
   5. Potable Water Contact Approval: National Science Foundation (NSF) certification for use on structures holding potable water, based on testing in accordance with NSF 61 and NSF 372.
   6. Manufacturer: As approved by Architect before use. See Section 01 6000.

R. Rapid Drying Admixture in Interior Concrete Slabs on Grade:
   1. Admixture specifically designed to promote rapid drying of concrete.
   2. Manufacturer: As approved by Architect before use. See Section 01 6000.

2.05 ACCESSORY MATERIALS

A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   3. Grout: Comply with ASTM C1107/C1107M.
   4. 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.
   5. Manufacturers: As approved by Architect before use. See Section 01 6000.

B. Non-Shrink Epoxy Grout: Moisture-insensitive, two-part; consisting of epoxy resin, non-metallic aggregate, and activator (use on expansion joints of interior slabs on grade of Welfare Services Projects):
   1. Composition: High solids content material exhibiting positive expansion when tested in accordance with ASTM C827/C827M.
   2. 100 percent solids, two-component, moisture-insensitive, semi-rigid epoxy for use as joint filler for saw cut and tooled interior joints.
   3. Self leveling consistency.
   4. Shore A Hardness: 75 to 80.
   5. Meet following minimum criteria:
      a. Tensile Strength: 600 psi (4.2 MPa).
      b. Ultimate Elongation: 35 percent.
   6. Manufacturers: As approved by Architect before use. See Section 01 6000.

C. Semi-Rigid Joint Filler (control joints of interior concrete slabs on grade in warehouse areas of Welfare Services Projects):

2.06 BONDING AND JOINTING PRODUCTS

A. Bonding Agents:
   1. Manufacturers: As approved by Architect before use. See Section 01 6000.

D. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.
   1. Manufacturers: As approved by Architect before use. See Section 01 6000.

E. 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. Manufacturers: As approved by Architect before use. See Section 01 6000.

F. Finishing Material (Exposed Vertical Faces of Foundation and Retaining Walls):
   1. Do not apply finishing material (parge coat) to foundation or retaining walls.

G. Slab Contraction Joint Device (if used): Preformed linear strip intended for pressing into wet concrete to provide straight route for shrinkage cracking.
   1. Manufacturers: As approved by Architect before use. See Section 01 6000.

2.07 CURING MATERIALS

A. Membrane Curing:
   2. Clear water-based, ready-to use membrane curing agent that cures freshly placed concrete, forming effective barrier against moisture loss from concrete surface.
   3. Design Criteria:
      a. Exterior Concrete:
         1) Dissipating or non-dissipating membrane curing agent.
      b. Interior Concrete:
         1) Dissipating membrane curing agent only.
         2) Gradually dissipate after twenty-eight (28) days without leaving stain or discoloring concrete surface.
      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.

4. Horizontal and Vertical Cast-In-Place Structural Concrete:
   a. 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.
         (f) Equal as approved by Architect before use. See Section 01 67000
      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.
            (1) 1100-Clear by W. R. Meadows, Inc. Hampshire, IL www.wrmeadows.com.
         (d) Equal as approved by Architect before use. See Section 01 6000.

15.08 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section and 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.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

D. 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 subgrade 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.

E. Surface Preparation:
1. Earthwork Preparation:
   a. Aggregate base and subgrade:
      1) Prepare aggregate base as specified in Section 312323.
      2) Prepare natural soil subgrade as specified in Section 31 2200.
      3) Prepare fill subgrade as specified in Section 31 2323.
2. Inserts, bolts, boxes, templates, pipes, conduits, and other accessories required by Divisions 22, 23, and 26 shall be installed and inspected before placing concrete.
3. Install inserts, bolts, boxes, templates, pipes, conduits, and other accessories furnished under other Sections to be installed as part of work of this Section:
   a. Tie anchor bolts for hold-down anchors and columns securely to reinforcing steel.

F. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
   1. Use latex bonding agent only for non-load-bearing applications.

G. Where new concrete with integral waterproofing is to be bonded to previously placed concrete, prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions. Saturate cold joint surface with clean water, and remove excess water before application of coat of waterproofing admixture slurry. Apply slurry coat uniformly with semi-stiff bristle brush at rate recommended by waterproofing manufacturer.

H. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

I. Removal:
   1. Remove water and debris from space to be placed.

3.03 INSTALLATION OF FORMWORK

A. Forms:
   2. Assemble forms so forms are sufficiently tight to prevent leakage.
   3. Properly brace and tie forms.
   4. Provide temporary cleanouts at base of tall forms if used to facilitate cleaning and inspection.
   5. Make proper form adjustments before, during, and after concreting.
   6. Use new forms, or used forms that have been cleaned of loose concrete and other debris from previous concreting and repaired to proper condition. Use APA Plyform B-B Class I, or APA HDO Plyform B-B Class I, on exposed to view concrete that do not receive a smooth rubbed finish.
   7. Use metal cold joint forms when unable to place concrete for footings, foundations, and slabs in continuous pours.
   8. Provide beveled 2 inch by 4 inch keys where shown on Contract Drawings for tall or heavily loaded walls.

B. Accessories:
   1. General:
      a. Provide for installation of inserts, templates, fastening devices, sleeves, and other accessories to be set in concrete before placing.
      b. Position anchor bolts for hold-down anchors and columns and securely tie in place before placing concrete.
   2. Form Release / Finish Agents:
      a. Film thickness shall be no thicker than as recommended by Manufacturer.
      b. Allow no release / finish agent on reinforcing steel or footings.
   3. Expansion Joints:
      a. Install at joints between floor slab and foundation wall where shown on Drawings.

C. Form Removal (Slab on Grade):
   1. Removal of forms can usually be accomplished in twelve (12) to twenty-four (24) hours.
   2. If temperature is below 50 deg F (10 deg C) or if concrete (stairs, beams, etc) depends on forms for structural support, leave forms intact for sufficient period for concrete to reach adequate strength.
   3. For exposed to view surfaces that receive a smooth rubbed finish, remove forms while concrete is still “green”.
   4. Metal bars or prys should not be used. Use wood wedges, tapping gradually when necessary.

3.04 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

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

B. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.

C. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

D. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

E. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

F. Avoid cutting or puncturing vapor retarder during reinforcement placement and concrete operations.

G. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

H. Blowtorch shall not be used to facilitate field cutting or bending or any other reinforcing work.

I. Reinforcement shall not be bent after partially embedded in hardened concrete.

J. 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.

K. Splices:
   1. Per requirements of Structural Drawings.

L. Tolerances:
   1. Provide following minimum concrete cover for reinforcement as per ACI 318 or ACI 318M.

M. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations:
   1. Concrete cast against and permanently exposed to earth:
      a. Interior Slabs on Grade: 1 inch clear from top of slab at 4 inches slabs, 2 inches clear at 6 inches slabs.
         1) Sections other than Slabs: 3 inches.
      b. Concrete Exposed to Earth or Weather:
         1) No. 6 and Larger Bars: 2 inches.
         2) No. 5 and Smaller Bars, W31 and D31 Wire: 1-1/2 inches.
      c. Concrete not exposed to weather or in contact with ground:
         1) Slabs, walls, and joists:
            (a) No. 14 and No. 18 bars: 1-1/2 inches.
            (b) No. 11 bars and smaller: 3/4 inches.
         2) Beams and Columns:
            (a) Primary reinforcement, ties, stirrups and spirals: 1-1/2 inches.

3.05 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Notify Architect not less than 24 hours prior to commencement of placement operations.

C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

D. General:
   1. Place as soon after mixing as possible.
   2. Deposit as nearly as possible in final position.
   3. No concrete shall be deposited in water.
   4. Placing of concrete shall be continuous until panel or section is complete.
   5. Compact concrete in forms by vibrating and other means where required.
      a. Thoroughly consolidate concrete around reinforcing bars (Consolidation not required in concrete around reinforcing bars with Mix Type G).
      b. Use and type of vibrators shall conform to ACI 309.
   6. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree into landscaped areas.
   7. Consolidate concrete thoroughly.
   8. Do not embed aluminum in concrete.
   9. Do not use contaminated, deteriorated, or re-tempered concrete.
   10. Avoid accumulation of hardened concrete.
   11. Dusting with cement not permitted.

E. Footings:
   1. Bear 12 inches (300 mm) minimum into undisturbed earth or on mechanically compacted engineered fill. Step footings at ratio of 1-1/2 horizontal to One vertical unless detailed otherwise.
   2. Level top of finish footing and leave rough.
   3. Where joints are required, bulkhead, key horizontally, and dowel with two No. 5 reinforcing bars, 48 inches (1 200 mm) long.

F. Miscellaneous Concrete Elements:
   1. Equipment Bases: Coordinate with appropriate Sections for locations and dimensions.
   2. Mow Strips and Aprons:
      a. Aggregate base not necessary under mow strips and aprons.
      b. Form and cast mow strips in place.
      c. Elevations:
         1) Refer to Section 32 9122-Topsoil Grading for relation of finish grades to top of mow strip elevations.
         2) Refer to Civil Drawings for top of apron elevations.
      d. Compact topsoil underneath mow strips and aprons to density of undisturbed earth.

G. Vertical Surfaces:
   1. Retaining Walls, Exposed Foundations, etc:
      a. Finish provided by form release / finish agent specified.
      b. Repair of Unacceptable Concrete.
   2. Immediately after removing forms, remove joints, marks, bellies, projections, loose materials, and cut back metal ties from surfaces to be exposed.
   3. Point up voids with cement mortar, 1:2 mix, and rub exposed surface with carborundum to smooth, even surface matching surrounding undamaged area.

H. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

I. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing

laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

3.06 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, immediately after form removal.

3.07 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

D. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   1. Normal concrete: Not less than seven days.
   2. High early strength concrete: Not less than four days.

E. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

F. Surfaces Not in Contact with Forms:
   1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by membrane curing, water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   2. Slabs and Floors To Receive Adhesive-Applied Flooring: Membrane Cure. Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
   3. Slabs and Floors to Receive Polished Finish: Water cure
   4. Final Curing: Begin after initial curing but before surface is dry.
      a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.
      b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.08 NON-SHRINK GROUTING

A. Surface Preparation:
   5. Prepare concrete surfaces in accordance with Manufacturer’s written instructions:
   6. Remove all loose materials.
   7. 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.
   8. Saturate area to be grouted with water in accordance with Manufacturer’s written instructions.

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.

F. Protect placed grout from freezing until minimum strength of 4000 psi (27.58 MPa) is reached.

G. Protect placed grout from damage during construction.

3.09 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. 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.

C. Provide free access to concrete operations at project site and cooperate with appointed firm.

D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

E. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

F. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.

G. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

H. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

I. Expansion Anchors / Adhesive Anchors / Screw Anchors:
1. Certified Inspector from Testing Agency shall verify procedures used for installation of all concrete anchors and monitor their installation for compliance with Manufacturer's requirements.
2. Inspections:
    a. Inspections shall include required verification and inspection of anchors as referenced in IBC Table 1704.4 and in accordance with most current version of ACI 318 or ACI 318M and applicable ASTM material standards that:
        1) The correct rod/anchor is used; size and type.
        2) The correct hole size is used and prepared per Manufacturer's instructions.
        3) That climactic conditions, and concrete temperature, allow for the anchors' installation and use.

4) Proper hole cleaning equipment, per Manufacturer's instructions, is used.
5) Torque applied to anchors does not exceed Manufacturer's allowable limits.
   (a) Torque applied to anchors is per Manufacturer's instructions.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.11 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

B. Protect installed products from damage during construction.

END OF SECTION

SECTION 07 9200

JOINT SEALANTS

PART 1 GENERAL

1.01 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.
   3. Section 07 2400: Sealants for EIF Systems.

1.02 REFERENCES

A. Reference Standards:
   4. 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 C1330-02(2013), ‘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’.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.

B. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.

C. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.

D. ASTM C1481 - Standard Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EIFS) 2012.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

F. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

H. ASTM C834 - Standard Specification for Latex Sealants 2017.

I. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

1.04 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.

1.05 SUBMITTALS

A. Action Submittals:
   3. 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:
   4. 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.
   5. 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.

1.06 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:
   3. 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.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:
   4. Deliver and keep in original containers until ready for use.
   5. 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 80 deg F (27 deg C) or as per Manufacturer's written recommendations.
   4. Do not use sealants that have exceeded shelf life of product.

1.08 FIELD CONDITIONS

A. Ambient Conditions:

5. Do not install sealant during inclement weather or when such conditions are expected. Allow wet surfaces to dry.
6. Follow Manufacturer’s temperature recommendations for installing sealants.
7. Ambient Conditions:
    a. Do not apply caulking at temperatures below 40 deg F (4 deg C).

1.09 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.
    b. Manufacturer's standard warranty covering sealant materials.
    c. Applicator’s standard warranty covering workmanship.

PART 2 PRODUCTS

2.01 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 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) Approved Products. See Section 01 6000:
        (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) Approved Products. See Section 01 6000:
        (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.

3. 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) Approved Products. See Section 01 6000:
            (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.

2.02 ACCESSORIES

A. Bond Breaker Tape:
   4. Pressure sensitive tape as by Sealant Manufacturer to suit application.
   5. Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.

C. 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.

D. Joint Cleaner:
   1. Non-corrosive and non-staining type as recommended by Sealant Manufacturer, compatible with joint forming materials.

E. Masking Tape:
   1. Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3 EXECUTION

3.01 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.

3.02 PREPARATION

A. Surface Preparation:
   5. 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.
   6. 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.

7. Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.

B. Joints:

1. Prepare joints in accordance with ASTM C1193.
   a. Clean joint surfaces of contaminates capable of affecting sealant bond to joint surface using Manufacturer's recommended instructions for joint preparation methods.
   b. Remove dirt, dust, oils, wax, paints, and contamination capable of affecting primer and sealant bond.
   c. Clean concrete joint surfaces to remove curing agents and form release agents.

C. Protection:

1. Protect elements surrounding the Work of this section from damage or disfiguration.

3.03 APPLICATION

A. General:

2. Apply silicone sealant in accordance with Manufacturer's instructions.
3. Do not use damaged or deteriorated materials.
4. Install primer and sealants in accordance with ASTM C1193 and Manufacturer's instructions.
5. Apply primer where required for sealant adhesion.
6. Install sealants immediately after joint preparation.
7. 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.

D. 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.

E. 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.

F. 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.

G. Install at perimeter joints and mechanical and electrical penetrations in sound insulated rooms. 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.

H. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface.

I. 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.

3.04 TOLERANCES

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

3.05 FIELD QUALITY CONTROL

A. Inspection:
   1. Examine sealant joints to verify compliance with Contract Document requirements.

B. Non-Conforming Work. Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
   2. Sealant material found to be contaminated or damaged or inadequate preparation of substrate results in deficiencies in joint sealant adhesion is considered defective or not complying with Contract Document requirements.
   3. Correct any work found defective or not-complying with Contract Document requirements at no additional cost to Owner.

C. Adhesion Test (Installer Option to use adhesion test to determine if primer is required).
   4. 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.
   5. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
   6. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

3.06 CLEANING

A. Remove sealant from adjacent surfaces in accordance with Sealant Manufacturer and Substrate Manufacturer recommendations as work progresses.

B. Remove masking tape and excess sealant.

C. Clean adjacent materials, which have been soiled, immediately (before setting) as recommended by Manufacturer.

D. Waste Management: Dispose of products in accordance with manufacturer's recommendation.

END OF SECTION

SECTION 31 0500

COMMON EARTHWORK REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General procedures and requirements for earthwork.

B. Verification of conditions.

C. Preparation.

D. Repair and restoration.

E. Field quality control.

1.02 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements: Procedures for testing, inspection, mock-ups, reports, certificates; use of reference standards.

B. Section 32 9001 - Common Planting Requirements:
   1. Pre-installation conference held jointly with other landscape related sections.

1.03 REFERENCES

A. Definitions:
   2. 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.
   3. Base: See Aggregate Base.
   4. 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.
   5. Compacted Fill: Placement of soils on building site placed and compacted per Contract Documents.
   6. Excavation: Removal of soil from project site or cavity formed by cutting, digging or scooping on project site.
   7. Fine Grading (FG): Preparation of subgrade preceding placement of surfacing materials (any aggregate base 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 any complicated fill but before placement of aggregate base or topsoil.
   8. Finish Grading: Completed surface elevation of landscaping areas for seeding, sodding and planting on building site.
   9. Natural Grade: Undisturbed natural surface of ground.
   10. 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.
   11. 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, sidewalks or topsoil.
   12. Topsoil Placement and Grading: Topsoil placement and finish grading work required to prepare site for installation of landscaping.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Consulting Engineers (Civil, Structural, Geotechnical) are to incorporate the requirements of the Geotechnical Evaluation Report for site specific requirements into all specification sections found in Division 31 and 32 as part of the design process.

B. Preinstallation Meeting: Schedule meeting after completion of site clearing but no less than one week before beginning grading work for all affected installers.
   1. Include a review of:
      a. Earthwork schedule.
         1) Site clearing.
         2) Earth moving
      b. Field tests and inspection requirements.
      c. Review Landscape Grading requirements.
      d. Termite control application requirements.
   2. Include a review of items that occur before pre-installation conference for landscape sections:
      a. Clearing and grubbing requirements.
      b. Topsoil stripping and stockpiling requirements.
      c. Landscape grading requirements.
      d. Landscape finish grade tolerance requirements.
      e. Landscape and plant tolerances.
      f. Surface preparation of landscape and planting areas.

C. Pre-installation meeting for landscape sections as specification in Section 32 9001:
   3. Schedule meeting after completion of Fine Grading, but one week minimum before beginning landscape work and held jointly with following sections:
      a. Section 32 9120 - Topsoil and Placement.
      b. Section 32 9122 - Topsoil Grading.
      c. Section 32 9223 - Sodding.
   4. Post-installation meeting: Review that following landscape items have been installed correctly:
      a. Topsoil placement.
      b. Topsoil surface preparation.
      c. Topsoil depth.
      d. Landscape finish grade tolerances.
      e. Surface preparation of landscape and planting areas.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Contact Underground Service Alert to arrange for utility location services forty-eight (48) hours, minimum, before performing any work on site.
   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. Notify Architect by phone or fax within twenty-four (24) hours upon discovery of conflicts or problems with existing facilities. Follow telephone or fax notification with letter and diagrams indicating conflict or problem with sufficient measurements and details to evaluate problem.

3.02 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.

3.03 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.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

D. Owner is responsible for Quality Assurance: Quality Assurance performed by Owner will be used to validate Quality Control by Contractor. Refer to Section 31 2323 Part 3 for subgrade, fill and aggregate base testing and inspection requirements.
   1. Quality Control is sole responsibility of Contractor.
   2. Testing and inspection of earthwork operations is required.
   3. Notify Architect if weather, scheduling, or any other circumstance has interrupted work, twenty-four (24) hours minimum, before intended resumption of work.

E. 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 1413

TOPSOIL STRIPPING AND STOCKPILING

PART 1 GENERAL

1.01 SUMMARY

A. Includes But Not Limited To:
   1. Strip and stockpile acceptable topsoil as described in Contract Documents.

B. Related Requirements:
   1. Section 31 0500: ‘Common Earthwork Requirements’:
      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 landscape related sections.
   2. Section 31 1000: ‘Site Clearing’.
   3. Section 31 2200: 'Grading'.
   4. Section 31 2316: ‘Excavation and Trenching’.
   5. Section 32 9001: 'Common Planting Requirements'.
   6. Section 32 9120: ‘Topsoil And Placement’.
   7. Section 32 9122: ‘Topsoil Grading’.

1.02 REFERENCES

A. Definitions:
   8. Existing topsoil: Defined as total amount of soil stripped and stored for reuse, less vegetation layer stripped and disposed of as specified in Paragraphs below.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:
   9. Participate in pre-installation conferences as specified in Section 31 0500.

PART 2 PRODUCTS: NOT USED

PART 3 EXECUTION

3.01 PERFORMANCE

A. Strip existing vegetation layer (6) inches (150 mm) deep minimum from areas of site to receive buildings, landscaping, and paving and remove from site before stripping topsoil for storage and reuse.

B. After stripping vegetation layer, strip existing topsoil additional inches (mm) deep minimum from areas of site to receive buildings and paving and store on site for later use.
   1. Existing topsoil is property of Contractor with restriction that topsoil is to be used first for Project landscape topsoil requirements and second for non-structural fill and backfill.
   2. After Project fill, backfill, and landscape topsoil requirements are satisfied, remove excess existing topsoil from site. Do not remove existing topsoil from site without Architect's written approval.

C. Screen existing topsoil to meet standards established as specified in Section 32 9120 ‘Topsoil And Placement’.

END OF SECTION

SECTION 31 2200

GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of topsoil.

B. Rough grading .

C. Fine grading

1.02 RELATED REQUIREMENTS

A. Section 31 0500 - Common Earthwork Requirements.

B. Section 31 1000 - Site Clearing.

D. Section 31 2316 - Excavation and Trenching.

E. Section 31 2323 - Fill and Aggregate Base: Filling and compaction of fill and aggregate base materials.

F. Section 32 9120 - Topsoil and Placement

G. Section 32 9122 - Topsoil Grading

H. Section 32 9223 - Sodding.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Per Section 31 0500 - Common Earthwork Requirements:.

1. Identify benchmark for establishing grades.
2. Examine site to pre-plan procedures for cuts, fill placements, and other necessary work.

1.04 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.05 QUALITY ASSURANCE

A. Owner is responsible for Quality Assurance: Quality Assurance performed by Owner will be used to validate Quality Control performed by Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil: See Section 32 9121.

B. Other Fill and Aggregate Base Materials: See Section 31 2323.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

C. Do not commence work of this Section until topsoil has been prepared, according to 32 9121.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

D. Locate, identify, and protect from damage above- and below-grade utilities to remain.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.

G. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

3.03 SOIL REMOVAL AND STOCKPILING

A. Stockpile excavated topsoil on site.

B. Stockpile topsoil to be re-used on site; remove remainder from site.

C. Remove excavated topsoil from site.

D. Stockpile excavated subsoil on site.

E. Stockpile subsoil to be re-used on site; remove remainder from site.

F. Remove excavated subsoil from site.

G. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

3.04 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots with sharp axe.

F. See Section 31 2323 for filling procedures.

G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

H. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.05 FINE GRADING

A. Preparation:
   1. Protection Of In-Place Conditions: Protect utilities and site elements from damage.
   2. 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 in size and foreign matter such as building rubble, wire, cans, sticks, concrete, etc.
      b. Remove imported paving base material present in planting areas down to natural subgrade or other material acceptable to Architect.
   3. 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.

3.06 TOLERANCES

A. Subgrade beneath compacted fill, aggregate base or topsoil shall be constructed smooth and even.

B. Rough Grading:
   4. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.
   5. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).

C. Fine Grading
   1. Subgrade (material immediately below aggregate base, natural soils or fill):
      a. 0.00 inches high.
      b. Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.
   2. Maximum variation from required grades shall be 1/10 of one foot (28 mm).
   3. Aggregate Base:
      a. Under Interior Concrete Slabs on Grade:
         1) Place 4 inches minimum of aggregate base under vapor retarder, level, and mechanically compact to ninety-five (95) percent minimum of maximum laboratory density as established by ASTM D1157.
      b. Under Equipment Pad Areas:
         1) Place 4 inches minimum of aggregate base, level, and mechanically compact to ninety-five (95) percent minimum of maximum laboratory density as established by ASTM D1157.
      c. Under Driveways And Parking Areas:
         1) Use 6 inches minimum aggregate base under paving for meetinghouse and CES projects, unless noted otherwise in Contract Drawings, and mechanically compact to ninety-five (95) percent minimum of maximum laboratory density as established by ASTM D1157.
         2) 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.
         3) Recompact unprimed aggregate base if it receives precipitation before pavement is laid.
         4) Remove or repair improperly prepared areas as directed by Architect.
         5) Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.
      d. Under Miscellaneous Concrete Site Elements (sidewalks, curbs, gutters, not mow strips) And Outside Face of Foundation Walls:
         1) Four inches minimum of aggregate base. Level, and mechanically compact to ninety-five (95) percent minimum of maximum laboratory density as established by ASTM D1157.
      e. Under Exterior Mow Strips:
         1) 6 inches of 3/4 inch gravel.
   4. Landscaping and Planting Tolerances:
      a. Maximum variation from required grades shall be 1/10 of one foot (28 mm).
      b. To allow for final finish grades as specified in Section 32 9121 of planting areas, fine grade elevations before placing topsoil and mulch are:
         1) Sod Areas: 7 inches (175 mm) below top of walk or curb.
         2) Seeded Areas: 6 inches (150 mm) below top of walk or curb.
         3) Ground Cover Areas: 7 inches (180 mm) below top of walk or curb.
         4) Tree And Shrub Areas: 4 inches (100 mm) below top of walk or curb.

D. Slope grade away from building as specified in Section 31 2323.

3.07 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.08 FIELD QUALITY CONTROL

A. See Section 31 2323 for compaction density testing.

3.09 CLEANING

A. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 31 2316

EXCAVATION AND TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures, and utilities within the building.

B. Trenching for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Section 31 0500 - Common Earthwork Requirements.

C. Section 31 1000 - Site Clearing: Vegetation and existing debris removal.

D. Section 31 2200 - Grading: Soil removal from surface of site.

E. Section 31 2200 - Grading: Grading.

F. Section 31 2323 - Fill and Aggregate Base: Fill materials, backfilling, and compacting.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Per Section 31 0500 - Common Earthwork Requirements and:
   1. Review protection of existing utilities requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 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.

3.02 PREPARATION

A. Locate, identify, and protect utilities that remain and protect from damage.

B. Contact Architect immediately upon discovery of undocumented utilities.

3.03 PERFORMANCE

A. Interface With Other Work:
   1. See Section 31 2323 for subgrade preparation at general excavations.

C. Excavate to accommodate new structures and construction operations.
   1. Excavate to the specified elevations.
   2. Excavate to the length and width required to safely install, adjust, and remove any forms, bracing, or supports necessary for the installation of the work.
   3. Cut utility trenches wide enough to allow inspection of installed utilities.
   4. Hand trim excavations. Remove loose matter.

D. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

E. Do not interfere with 45 degree bearing splay of foundations.

F. Provide temporary means and methods, as required, to remove all water from excavations until directed by Architect. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

G. Utility Trenches:
   1. 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.
   2. Excavate to proper alignment, depth, and grade. Excavate to sufficient width to allow adequate space for proper installation and inspection of utility piping.
   3. If trenches are excavated deeper than required, backfill until trench bottom is proper depth with properly compacted native material.
   4. Pipe 4 inches in Diameter or Larger:
      a. Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its length.
      b. Except where rock is encountered, take care not to excavate below depths indicated.
         1) Where rock excavations are required, excavate rock with minimum over-depth of 4 inches below required trench depths.
         2) Backfill over-depths in rock excavation and unauthorized over-depths with loose, granular, moist earth, thoroughly compacted.
      c. 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 grave, or other suitable material acceptable to Architect.

3.04 REPAIR

A. Repair damage to other portions of the Work resulting from wok of this Section at no additional cost to Owner. Arrange for damage to be repaired by original installer.

B. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 2323.

3.05 CLEANING

A. Stockpile excavated material to be re-used in area designated on site in accordance with Section 31 2200.

B. Remove excavated material that is unsuitable for re-use from site.

C. Remove excess excavated material from site.

END OF SECTION

SECTION 31 2323

FILL AND AGGREGATE BASE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for building volume below grade, footings, slabs-on-grade, paving, and utilities within the building.

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

D. Aggregate Base:

1.02 RELATED REQUIREMENTS

A. Section 31 0500 - Common Earthwork Requirements

B. Section 31 1000 - Site Clearing

C. Section 31 2200 - Grading: Removal and handling of soil to be re-used.

E. Section 31 2200 - Grading: Site grading.

F. Section 31 2316 - Excavation and Trenching: Removal and handling of soil to be re-used.

1.03 REFERENCE STANDARDS

A. ASTM C150/C150M - Standard Specification for Portland Cement 2022.

B. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.

C. ASTM C796/C796M - Standard Test Method for Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam 2019.

D. ASTM D1883 - Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils 2016.

E. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2017, with Editorial Revision (2020).

F. ASTM D6817/D6817M - Standard Specification for Rigid Cellular Polystyrene Geofoam 2017 (Reapproved 2021).

G. ASTM D7557/D7557M - Standard Practice for Sampling of Expanded Polystyrene Geofoam Specimens 2009 (Reapproved 2021).

H. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs 2018a.

1.04 DEFINITIONS

A. Lightweight (Flowable) Concrete Fill::
   1. Self-leveling and self-compacting, cementitious material.
   2. Unconfined compressive strength of less than 150 psi.
   3. Cementitious slurry consisting of mixture of fine aggregate of filler, water and cementitious materials, which is used as fill or backfill in lieu of compacted earth. This material is capable of filling all voids in irregular excavations and hard to reach places (such as under undercuts of existing slabs), is self-leveling, and hardens in a matter of a few hours without need for compacting in layers. Lightweight (Flowable) concrete fill is sometimes referred to as excavatable flowable fill, controlled density fill , controlled low strength material, lean concrete slurry, and unshrinkable fill. Flowable fill is not concreter nor used to replace concrete. it is intended to contain low cementitious content for reduced strength development.

B. 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.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Mix design for Lightweight (Flowable) Concrete Fill.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.

D. Compaction Density Test Reports.

E. Lightweight (Flowable) Concrete Fill Test Reports.

F. Testing Agency Qualification Statement.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Participate in pre-installation meeting as specified in Section 31 0500.

1.07 QUALITY ASSURANCE

A. Testing and Inspection:
   1. Owner will provide Testing and Inspection for fill and aggregate base:
      a. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
   2. 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.
      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 and perform contractor testing and inspection.

B. Designer Qualifications: Perform design of structural fill under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

D. Scheduling:
   1. Allow special inspector to review all subgrades and excavations to determine if site has been prepared in accordance with geotechnical evaluation report prior to placing any fill or aggregate base (or concrete).
   2. Notify Testing Agency and Architect seventy-two (72) hours minimum before installation of fill or aggregate base to perform proctor and plasticity index tests on proposed fill, aggregate base or subgrade.
   3. Notify Testing Agency and Architect twenty-four (24) hours minimum before installation of fill or aggregate base to allow inspection.
   4. Allow Inspection and Testing Agency to inspect and test subgrades and each fill and aggregate base layer. Proceed with subsequent earthwork only after inspections and test results for prior compacted work comply with requirements.
   5. 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 subgrades and excavations to determine if building pad has been prepared in accordance with geotechnical report prior to placing any aggregate base.
   6. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing concrete for exterior site work concrete (sidewalks, curbs, gutters), footings, foundation walls, and building slabs to allow inspection of aggregate base.

7. Paving:
    a. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing aggregate base to allow inspection of aggregate base.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill - Fill Type [A]: Subsoil excavated on-site.
    1. Graded.
    2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
    3. Complying with ASTM D2487 Group Symbol CL.

B. Fill:
    1. Well graded material conforming to ASTM D2487 free from debris, organic material, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.
        a. Under Building Footprint And Paved Areas: Fill shall comply with soil classification groups GW, CL, GP, GM, SW, SP, or SM. Fill may not contain stones over 6 inches diameter and ninety-five (95) percent minimum of fill shall be smaller than 1-1/2 inch in any direction.
        b. Under Landscaped Areas:
            1) Fill more than 36 inches below finish grade shall comply with soil classification groups GW, CL, GP, GM, SW, SP, or SM. Fill may not contain stones over 6 inches (150 mm) diameter and ninety (90) percent minimum of fill shall be smaller than 1-1/2 inch in any direction.
            2) Fill less than 36 inches below finish grade shall comply with soil classification groups SW, SP, SM, or SC. Fill may not contain stones larger than 1-1/2 inches in any direction and ninety (90) percent minimum of fill shall be smaller than 3/8 inch in any direction.

C. Aggregate Base:
    1. Under Exterior Concrete excluding Under Paving (sidewalks, curbs, gutters):
        a. New Aggregate Base:
            1) Road Base to conform to State DOT Specifications.
    2. Under Exterior Mow Strips:
        a. 3/4 inch gravel.

D. SOURCE QUALITY CONTROL
    1. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.
    2. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
    3. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.
    1. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Before placing fill, aggregate base, or finish work, prepare existing subgrade as follows:

1. Under Building Slab, Equipment Pad, Under Driveways, Parking, Under Miscellaneous Concrete Site Elements And Outside Face of Foundation Wall Areas:
    a. Do not place fill or aggregate base over frozen subgrade.
    b. Moisture condition to uniform moisture content of between optimum and four (4) percent over optimum, and mechanically compact 6 inches deep to ninety-five (95) percent minimum of relative compaction.
    c. Finish grade to grades required by Contract Documents.
2. Landscape Areas:
    a. Compact subgrade to eight-five (85) percent relative compaction.

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

E. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

F. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 PERFORMANCE

A. Interface With Other Work:
1. Section 31 2200 - Grading for rough grading and preparation of natural soil subgrades below fill and aggregate base materials.
2. Section 31 2200 - Grading for grading of subgrade below aggregate base and topsoil.
3. Do not place fill or aggregate base material when subgrade is frozen or unstable.
4. Remove all standing water before placing fill or aggregate base material.

B. Fill:
5. General:
    a. Do not fill against bituminous dampproofing to exterior of font foundation walls for twenty-four (24) hours after application of dampproofing.
    b. Before backfilling, show utility and service lines being covered on record set of Drawings. Do not backfill until utilities involved have been tested and approved by Architect and until instructed by Architect.
    c. Around Buildings And Structures: Slope grade away from building as specified unless noted otherwise in Contract Drawings. Hand backfill when close to building or where damage to building might result.
    d. Site Utilities:
        1) In Landscape Areas: Use backfill consisting of on-site soil.
        2) Under Pavement and Concrete Site Elements: Extend excavatable flowable fill/backfill to elevation of subgrade. Do not place aggregate base material until excavatable flowable fill/backfill has cured seventy-two hours.
    e. Do not use puddling or jetting to consolidate fill areas.

C. Compacting:
2. Under Miscellaneous Concrete Site Elements (sidewalks, curbs, gutters, not mow strips) And Outside Face of Foundation Walls:
    a. Fill:
        1) Place in 8 inch maximum uncompacted layers, dampen but do not soak, and mechanically compact to ninety-five (95) percent minimum of maximum laboratory density as established by ASTM D1557.
    b. Aggregate Base:
        1) Four inches minimum of aggregate base. Level, and mechanically compact to ninety-five (95) percent minimum of maximum laboratory density as established by ASTM D1157.
3. Under Exterior Mow Strips:
    a. Aggregate Base:
        1) 6 inches of 3/4 inch gravel.

4. Utility Trenches:
    a. Site:
        1) Fill:
            (a) Place fill in 12 inch maximum uncompacted layers and moisture condition to plus or minus two (2) percent of optimum moisture content.
            (b) Compact fill to ninety-five (95) percent minimum relative compaction to within 12 inches of finish grade.
            (c) Compact fill above 12 inches to eight-five (85) percent relative compaction.
    b. Under Miscellaneous Slabs:
        1) Fill:
            (a) Place in 6 inch maximum uncompacted layers, moisture condition to plus or minus two (2) percent of optimum moisture content, and compact to ninety-five (95) percent minimum relative compaction to within 4 inches of finish grade.
        2) Aggregate Base:
            (a) Place 4 inches minimum of aggregate base, level, and compact. as specified in Part 3.
5. Fill Slopes: Compact by rolling or using sheepsfoot roller.
6. Landscape Areas:
    a. Compact fill to eighty-five (85) percent minimum relative compaction.
7. Other Backfills: Place other fills in 12 inch maximum uncompacted layers and compact to ninety-five (95) percent relative compaction.
8. Loose material from compacted subgrade surface shall be immediately removed before placing compacted fill or aggregate base course.

D. Fill to contours and elevations indicated using unfrozen materials.

E. Employ a placement method that does not disturb or damage other work.

F. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

G. Maintain optimum moisture content of fill materials to attain required compaction density.

H. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 TOLERANCES

A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

3.05 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.

3.06 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Field Tests and Inspections:
1. Field tests and inspections and laboratory testing are provided by Owner's independent Testing Agency as specified in Section 01 4523.
    a. Quality Control is sole responsibility of Contractor:
        1) Owner's employment of an independent Testing Agency does no relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
            (a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.

2. Fill/Engineered Fill:
    a. Testing Agency shall provide testing and inspection for fill.
    b. Number of tests may vary at discretion of Architect.
    c. Testing Agency is to provide one (1) moisture-maximum density relationship test for each type of fill material.
    d. Prior to placement of engineered fill, inspector shall determine that site has been prepared in accordance with geotechnical evaluation report.
    e. Footing sugrade: At footing subgrades, inspector is to verify that soils confor to geotechnical evaluation report.
    f. Testing Agency will test compaction of soils according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938 as applicable. Lift thicknesses shall comply with geotechnical evaluation report. Inspector shall determine that in-place dry density of engineered fill material complies with geotechnical evaluation report. Tests will be performed at following locations and frequencies:
        1) Paved Areas: At each compacted fill and backfill layer, at least one (1) test for every 10,000 sq. ft. or less of paved areas but in no case less than three (3) tests.
        2) Building Slab Areas: At each compacted fill and backfill layer, at least one (1) test for every 2,500 sq. ft. or less of building slab area but in no case less than three (3) tests.
        3) Foundation Wall/Continuous Footing Backfill: At each compacted backfill layer, at least one (1) test for each 40 linear feet or less of wall length, but no fewer than two (2) tests.
        4) Trench Backfill: At each 12 inch compacted lift for each 100 linear feet or less of trench length but no fewer than two (2) tests.
        5) Sidewalks, Curbs, Gutters, Exterior Pads: Minimum of one (1) test for each lift for each 40 linear feet or one (1) test for every 5,000 sq. ft. or less of pad area but no fewer than three (3) tests.
3. Aggregate Base:
    a. 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.

3.07 CLEANING

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 32 9001

COMMON PLANTING REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Common procedures and requirements for landscaping work.
   2. Provide maintenance for new landscaping as described in Contract Documents.

B. Related Requirements:
   1. Pre-Installation conferences held jointly with Section 32 9001 as described in Administrative Requirements on Part 1 of this specification section:
   2. Section 01 4000: 'Quality Assurance – Qualifications'.
   3. Section 31 0500: ‘Common Earthwork Requirements’.
   4. Section 31 1000: ‘Clearing and Grubbing’.
   5. Section 31 1413: ‘Topsoil Stripping And Stockpiling’.
   6. Section 31 2000: ‘Grading’.
   7. Section 31 2316: ‘Excavation’.
   8. Section 31 2323: ‘Fill’.
   9. Section 32 9120: ‘Topsoil And Placement’.
   10. Section 32 9122: ‘Topsoil Grading’.
   11. Section 32 9223: 'Sodding'.

1.2 REFERENCES

A. Definitions:
   1. Landscape Management Plan (LMP): LMP is an Owner’s Representative’s quick reference maintenance document. It combines elements from Irrigation Sections 32 8000 and Planting Sections 32 9000. The LMP document is created from Operations and Maintenance Data, Warranty Documentation, and Record Documentation. This is a digital format only document. Deliver to Church Headquarters for inclusion in "as-built" catalog. Send to mfd-asbuilt@churchofjesuschrist.org. Access sample LMP through Landscape Resources Website located at:
      a. https://aec.churchofjesuschrist.org/aec/landscape/.
   2. Landscape Final Acceptance: Inspection, no less than (30) days following substantial completion, when all work has been completed, demonstrated, and approved by the Landscape Architect. Coordinate with 32 8000 and 32 9000 Sections.
   3. Plant Establishment Period: Time required for plants to successfully develop root systems into surrounding soil. Following this period, irrigation run times are typically modified. For purposes of this contract, the plant establishment period is one (1) year from date of Substantial Completion.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordinate work with other Sections.

C. Pre-Installation Conference:
   1. Participate in MANDATORY pre-installation conference and held jointly with following sections:
      a. Section 32 9120: ‘Topsoil And Placement’.
      b. Section 32 9122: ‘Topsoil Grading’.
      c. Section 32 9223: 'Sodding'.
   2. In addition to agenda items specified in Section 01 3000, review the following:
      a. Site Visits:
         1) Landscape Architect to visit site five (5) times during project construction.

2) If site conditions necessitate additional visits, Landscape Architect can schedule addition site visits with approval from Architect.
3) During construction, addition site visits may be approved in writing by Architect or Owner for special considerations before commencement.
4) Site visits caused by lack of work progress by Landscape Subcontractor shall be reimbursed to Landscape Architect by Landscape Subcontractor for the amount determined by Architect and Owner for additional site visits.

b. Coordination:
1) Landscape Subcontractor and Landscape Architect to coordinate site visits and include Architect and General Contractor in communications.

c. Landscape Maintenance:
1) Establish responsibility for maintenance of new landscaping during all phases of construction period.

d. Percolation Test:
1) Discuss percolation test requirements per Section 32 9300.

e. Review additional agenda items as specified in related sections listed above.

3. Approved Site Visits:
a. Site Visit No. 1:
1) Description:
(a) Landscape pre-installation Conference.
2) Schedule: Conduct pre-installation conference after completion of Finish Grading specified in Section 31 0500 and (1) week minimum before beginning landscape work.
3) Required Attendees:
(a) Project Manager, Facilities Manager, Architect, General Contractor, Landscape Subcontractor, Excavator, and Landscape Architect.
(b) Include Landscaping Subcontractor Foreman and those responsible for installation of landscaping to be in attendance.
4) Related Sections:
(a) Section 31 0500: 'Common Earthwork Requirements'.
(b) Section 32 9120: ‘Topsoil And Placement’.
(c) Section 32 9122: ‘Topsoil Grading’.
(d) Section 32 9223: 'Sodding'.
5) Notes:
(a) Verify project site conditions and review scope of work before installation begins.
(b) Verify appropriate sub-grades have been established.

b. Site Visit No. 2:
1) Description:
(a) Irrigation system pressure test compliance, main line inspection, valve inspection.
2) Schedule: Conduct site visit one (1) week minimum after notification before beginning irrigation system pressure test.
3) Required Attendees:
(a) General Contractor, Landscape Subcontractor, Landscape Architect.
4) Recommended Attendees:
(a) Project Manager, Facilities Manager.
5) Related Sections:
(a) Section 32 9120: ‘Topsoil And Placement’.
(b) Section 32 9122: ‘Topsoil Grading’.
6) Notes:
(a) Verify finish grading in preparation for planting.

c. Site Visit No. 3:

1) Description:
(a) Inspect and approve plant quality, plant quantity, plant pits, plant pit backfill, planting depths, and removal of packaging/distribution materials, wire, and ties.
2) Schedule: Conduct site visit one (1) week minimum after notification from Contractor before beginning site visit no. 3.
3) Required Attendees:
(a) General Contractor, Landscape Subcontractor, Landscape Architect.
4) Recommended Attendees:
(a) Project Manager, Facilities Manager.

d. Site Visit No. 4:
1) Description:
(a) Comprehensive Substantial Completion inspection prior to beginning thirty (30) day Landscape Subcontractor maintenance period.
2) Schedule: Conduct site visit one (1) week minimum after notification before beginning site visit no. 4.
3) Required Attendees:
(a) Project Manager, Facilities Manager, Architect, General Contractor, Landscape Subcontractor, Landscape Architect.
4) Notes:
(a) Verify contract requirements have been followed including but not limited to: planting compliance, irrigation system coverage and irrigation system operation.

e. Site Visit No. 5:
1) Description:
(a) At the end of thirty (30) day Landscape Subcontractor maintenance period, verify deficient items have been corrected and verify no others exist.
2) Schedule: Conduct site visit one (1) week minimum after notification before beginning site visit no. 5.
3) Required Attendees:
(a) Project Manager, Facilities Manager, Architect, General Contractor, Excavation Subcontractor, Landscape Subcontractor, Landscape Architect.
4) Notes:
(a) Review Landscape Management Plan (LMP) with Owner's Representative. Provide landscape maintenance training.

1.4 SUBMITTALS

A. See Section 01 3000-Administrative Requirements, for submittal procedures. Submittals may be included in more than one submittal group listed below.

B. Submittals for Information:
1. Establishment Period Acknowledgement:
a. Landscape Architect will provide acknowledgment of Establishment Period commencement:
1) Certificate will include name and signature of Contractor, Contractor’s company, Contractor’s telephone number, and date.
2) Certificate will include name and signature of Owner’s Representative, Owner’s Representative’s Group name, Owner’s Representative Group telephone number, and date.
3) Certificate will acknowledge date when Establishment Period begins and that it extends one (1) year from that time.

C. Submittals for Project Closeout:
1. Operations and Maintenance Data:
a. Landscape maintenance recommendations.
b. Individual plant maintenance recommendations.

c. Plant establishment maintenance recommendations.
d. Post-plant establishment maintenance recommendations.

2. Record Documentation:
   a. Landscape Drawings:
      1) As installation occurs, prepare accurate record drawings. Submit electronic copy prior to final inspection. Drawing shall include:
         (a) Detail and dimension changes made during construction.
         (b) Take dimensions from permanent constructed surfaces or edges located at or above finish grade.
3. Landscape Warranty - See Section 32 9300.
4. Landscape Management Plan (LMP):
   a. Landscape Section. Include the following:
      1) Operations and Maintenance Data:
      2) Record Documentation including Landscape Drawings.
      3) Landscape Warranty
      4) Establishment Period Acknowledgement

1.5 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:
   1. Herbicides:
      b. Products shall be recognized for intended use by AHJ.
   2. Invasive and Non-native plants:
      a. Comply with all applicable laws governing invasive and non-native plants.

D. Installer Qualifications:
   1. Landscape Subcontractor. Requirements of Section 01 4301 applies, but not limited to following:
      a. Company specializing in performing work of this section.
      b. Minimum five (5) years' experience in landscaping installations.
      c. Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
      d. Upon request, submit documentation.
   2. Installer:
      a. Planting shall be performed under direction of foreman or supervisor with minimum three (3) years' experience in landscape installations similar in size, scope, and complexity.
      b. Foreman or supervisor required to attend pre-installation conference.
      c. Use trained personnel familiar with required planting procedures and with Contract Documents.
   3. Submit documentation upon request.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage And Handling Requirements:
   1. Deliver packaged materials in containers showing weight, analysis, and name of Manufacturer.
   2. Deliver sod, plants, trees, and shrubs in healthy and vigorous condition.
   3. Protect materials from deterioration during delivery.

B. Storage And Handling Requirements:
   1. Store in location on site where they will not be endangered and where they can be adequately watered and kept in healthy and vigorous condition.
   2. Protect materials from deterioration while stored at site.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:
   1. Inspect site and Contract Documents to become thoroughly acquainted with locations of irrigation, ground lighting, and utilities.

3.2 PREPARATION

A. Before proceeding with work, verify dimensions and quantities. Report variations between Drawings and site to Architect before proceeding with landscape work.
   2. Plant totals are for convenience of Contractor only and are not guaranteed. Verify amounts shown on Drawings.
   3. All planting indicated on Contract Documents is required unless indicated otherwise.

B. Protection:
   1. Mitigate or eliminate if possible conditions that will create hazards. Post signs or barriers as required.
   2. Provide adequate means for protection from damage through excessive erosion, flooding, heavy rains, etc. Repair or replace damaged areas.
   3. Keep site well drained and landscape excavations dry.

3.3 INSTALLATION

A. Interface With Other Work:
   4. Do not plant trees and shrubs until major construction operations are completed. Do not commence landscaping work until work of Section 31 2216 and Section 32 8423 has been completed and approved.

C. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.

D. Hand excavate as required.

E. Maintain grade stakes until parties concerned mutually agree upon removal.

F. When conditions detrimental to plant growth are encountered, such as rubble fill or adverse drainage conditions, notify Architect before planting.

3.4 FIELD QUALITY CONTROL

A. Field Inspection:
   1. Landscape Architect will inspect landscaping installation for Substantial Completion.

B. Non-Conforming Work. Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
   1. Replace damaged plantings within (10) days of notification at no additional cost to Owner.
   2. Repair damage to irrigation, ground lighting, utilities, paving, concrete curb and gutters and other items adjacent to landscaping caused by work of this Section or replace at no additional cost to Owner.

3.5 CLEANING

A. Waste Management:
   3. Immediately clean up soil or debris spilled onto pavement and dispose of deleterious materials.

3.6 CLOSEOUT ACTIVITIES

A. Instruction to Owner:
   1. Establishment Period Acknowledgement (coordinate with 32 8000 section(s)):
      a. Landscape Architect will acknowledge Establishment Period commencement.

3.7 PROTECTION

A. Protect planted areas against traffic or other use immediately after planting is completed by placing adequate warning signs and barricades.

B. Provide adequate protection of planted areas against trespassing, erosion, and damage of any kind. Remove this protection after Architect has accepted planted areas.

3.8 MAINTENANCE

A. General:
   1. Before beginning maintenance period, plants shall be in at least as sound, healthy, vigorous, and in approved condition as when delivered to site, unless accepted by Architect in writing at final landscape inspection.
   2. Maintain landscaping for thirty (30) continuous days minimum after Substantial Completion. If maintenance period is interrupted by non-growing season or irrigation winter shut-down, begin maintenance period after start of growing season as agreed with Architect, and continue one (1) continuous month therefrom.
   3. Replace landscaping that is dead or appears unhealthy or non-vigorous as directed by Landscape Architect before end of maintenance period. Make replacements within ten (10) days of notification. Lawn being replaced shall be guaranteed and maintained an additional thirty (30) days from date of replacement.

C. Sodded Lawn:
   1. Maintain sodded lawn areas until lawn complies with specified requirements and throughout maintenance period.
   2. Water sodded areas in sufficient quantities and at required frequency to maintain sub-soil immediately under sod continuously moist 3 to 4 inches (75 to 100 mm) deep.
   3. Cut grass first time when it reaches 3 inches (75 mm) high. Continue to mow at least once each week throughout maintenance period. Remove clippings.
   4. Apply herbicide as necessary to maintain weed-free lawn. Apply herbicide in accordance with manufacturer's instructions during calm weather when air temperature is between 50 and 80 deg F (10 and 27 deg C).
   5. At end of thirty (30) day maintenance period, fertilize lawns as recommended in Section 32 9122.

END OF SECTION

SECTION 32 9120

TOPSOIL AND PLACEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Perform topsoil evaluation and placement required prior to topsoil grading as described in Contract Documents.

B. Related Requirements:
   1. Section 31 0500: 'Common Earthwork Requirements':
   2. Section 31 1413: 'Topsoil Stripping And Stockpiling'.
   3. Section 31 2200: ‘Grading’.
   4. Section 32 9001: 'Common Planting Requirements':
   5. Section 32 9122: ‘Topsoil Grading’.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:
   1. Participate in MANDATORY pre-installation conference as specified in Section 32 9001.
   2. In addition to agenda items specified in Section 01 3100 and Section 32 9001, review following:
      a. Review finish grade elevation and tolerance requirements.
      b. Review surface preparation requirements including disking, tilling, ripping, or aerating.
      c. Review Attachment 'Topsoil Testing Report' including:
         1) Landscape Architect, Contractor, Testing, and Soil Testing Laboratory Instructions.
      d. Review Field Quality Control testing requirements for 'Topsoil Testing Report' including:
         1) Corrections required for topsoil not meeting requirements of this specification.
         2) Approval requirement of ‘Topsoil Testing Report’ by Landscape Architect.
         3) Submittals required as identified in Closeout Submittals.

1.3 SUBMITTALS

A. See Section 01 3000-Administrative Requirements, for submittal procedures. Submittals may be included in more than one submittal group listed below.

C. Submittals for Review:
   1. Do not commence work or deliver products to site until Landscape Architect approves submittals for review.
   2. Testing And Evaluation Reports:
      a. Completed ‘Topsoil Testing Report’. Follow testing directives of Part 3 of this specification.
         1) Access 'Topsoil Testing Report' template through:
            (a) https://aec.churchofjesuschrist.org/aec/design_guidelines/
            (b) Go to the Landscape sub-section.
         2) Owner will pay for one (1) final test.
         3) Additional test(s) if necessary will be paid by Contractor.
      b. Submit report stating location of imported topsoil source and describe recent use(s).

D. Submittals for Information
   1. Submit delivery slips indicating amount of topsoil delivered to Project site.

E. Submittals for Project Closeout:

1. Record Documentation:
    a. Final Landscape Architect approved ‘Topsoil Testing Report’.
    b. Imported topsoil source and recent use as described above.
2. Landscape Management Plan (LMP):
    a. Landscape Section. Include the following:
        1) ‘Topsoil Testing Report’.

PART 2 PRODUCTS

2.1 MATERIALS

A. Topsoil:
    1. Design Criteria:
        a. Topsoil used in landscaped areas, whether imported, stockpiled, or in place, shall be weed free, fertile, loose, friable soil meeting following criteria:
            1) Chemical Characteristics:
                (a) 5 to 8.0.
                (b) Soluble Salts: less than 3.0 mmhos/cm.
                (c) Sodium Absorption Ratio (SAR): less than 6.0.
                (d) Organic Matter: greater than one percent.
            2) Physical Characteristics:
                (a) Gradation as defined by USDA triangle of physical characteristics as measured by hydrometer.
                (b) Sand: 15 to 60 percent.
                (c) Silt: 10 to 60 percent.
                (d) Clay: 5 to 30 percent.
                (e) Clean and free from toxic minerals and chemicals, noxious weeds, rocks larger than or equal to 1-1/2 inch (38 mm) in any dimension, and other objectionable materials.
                (f) Soil (Coordinate screening as specified in Section 31 1413 'Topsoil Stripping And Stockpiling' to meet these characteristics):
                (g) Soil shall not contain more than five (5) percent by volume of rocks measuring over 1/4 inch (6 mm) in largest size.
                (h) Soil shall be topsoil in nature.
                (i) Soil resembling road base or other like materials are not acceptable.
    2. Project Topsoil Requirements:
        a. It is anticipated that the following percentages of material will be required to meet Project site topsoil requirements:
            1) Imported Topsoil: __100%__ percent of landscape area:
                (a) Lawn Areas: __6%__ percent of imported topsoil.
                (b) Shrub / Tree Areas: __94%__ percent of imported topsoil.
                (c) Native Grass / Shrub / Tree Areas: __0%__ percent of imported topsoil.
            2) Stockpiled Topsoil: __0%__ percent of landscape area:
                (a) Lawn Areas: __N/A__ percent of stockpiled topsoil.
                (b) Shrub / Tree Areas: __N/A__ percent of stockpiled topsoil.
                (c) Native Grass / Shrub / Tree Areas: __N/A__ percent of stockpiled topsoil.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:
    1. Do not commence work of this Section until grading tolerances specified in Section 31 2200 are met.

2. Do not commence work of this Section until coordination with Section 32 9122 ‘Topsoil Grading’.
3. Receive approval from Landscape Architect of subgrade elevations prior to commencement of this Work.

3.2 PREPARATION

A. Protection Of In-Place Conditions:
   4. Protect utilities and site elements from damage.

B. Surface Preparation:
   1. Surfaces to receive Imported and Stockpiled Topsoil:
      a. Disk, till, rip, or aerate with approved agricultural aerator to depth of 6 inches (150 mm).
      b. Place specified and approved topsoil on prepared surface.

3.3 PERFORMANCE

A. General:
   2. After Surface Preparation requirements are completed, limit use of heavy equipment to areas no closer than 6 feet (1.80 meter) from building or other permanent structures. Use hand held tillers for preparation of subsoil in areas closer than 6 feet (1.80 m).
   3. Do not disturb existing shrub or tree roots to remain.

C. Topsoil Depth/Quantity:
   1. Total topsoil depth of 5 inches (125 mm) minimum in lawn and groundcover planting areas.
   2. No topsoil as defined in this Section is required over tree and shrub planting areas or native grass, shrub, or tree areas as long as what is in place is not excessively rocky or otherwise unfavorable to healthy plant growth.
   3. Provide no less than quantity required to achieve tolerance described in Section 32 9122 'Topsoil Grading' along with additional soil amendments required. Installer of this section responsible for providing sufficient topsoil material.

D. Imported Topsoil:
   1. Place tested and approved topsoil:
      a. Before placing topsoil, remove organic material, rocks and clods greater than 1-1/2 inch (38 mm) in any dimension, and other objectionable materials.
      b. Do not place topsoil whose moisture content makes it prone to compaction during placement process.
      c. Do not place topsoil when subgrade is either wet or frozen enough to cause clodding.

E. Stockpiled Topsoil:
   1. Redistribute tested and approved existing topsoil stored on site as result of work of Section 31 1413 'Topsoil Stripping And Stockpiling'.
      a. Before placing topsoil, remove organic material, rocks and clods greater than 1-1/2 inch (38 mm) in any dimension, and other objectionable materials.
      b. Do not place topsoil whose moisture content makes it prone to compaction during placement process.
      c. Do not place topsoil when subgrade is either wet or frozen enough to cause clodding.

F. In Place Topsoil:
   1. At locations where topsoil can remain in place and has been tested and approved, perform the following:
      a. Remove existing vegetation as required in preparation for new landscaping.
      b. Remove vegetative layer, roots, organic material, rocks and clods greater than 1-1/2 inch (38 mm) in any dimension, and other objectionable materials.

G. Grading:
   1. Slope grade away from building for 12 feet (3.60 m) minimum from walls at slope of 1/2 inch in 12 inches (13 mm in 300 mm) minimum unless otherwise noted.

a. High point of finish grade at building foundation shall be 6 inches (150 mm) minimum below finish floor level.
b. Direct surface drainage in manner indicated on Contract Documents by molding surface to facilitate natural run-off of water.
c. Fill low spots and pockets with topsoil and grade to drain properly.

3.4 FIELD QUALITY CONTROL

A. Testing And Inspections:
1. Topsoil Testing:
a. Test topsoil for project suitability using Section 1 described ‘Topsoil Testing Report’:
1) Testing requirements:
(a) If testing report shows topsoil does not meet topsoil Design Criteria (Section 2) and Topsoil Testing Report, 'Soil Test Data' and 'Rocks’ requirements, topsoil is non-conforming. Corrections and re-testing are required until topsoil meets requirements.
(b) Use new ‘Topsoil Testing Report’, each time topsoil is tested.
(c) After topsoil is approved by Landscape Architect, submit final ‘Topsoil Testing Report as specified in Part 1 ‘Submittals’.

B. Non-Conforming Work:
1. If topsoil does not meet topsoil Design Criteria and ‘Topsoil Testing Report: Soil Test Data’ requirements topsoil will be re-tested at no cost to Owner.
a. Correction procedures:
1) Topsoil not meeting specified physical characteristics of sand, silt, and clay shall be removed from site.
2) Topsoil not meeting specified organic or fertility specifications may be amended in place with materials recommended in Topsoil Testing Report.
3) If amendments are necessary, submit proposed amendments and application rates required to bring topsoil up to minimum specified requirements.
4) Re-test topsoil and remove and amend as required until it meets minimum specified requirements.
b. Submit report to Landscape Architect for approval.
c. Receive approval from Landscape Architect prior to planting.

END OF SECTION

SECTION 32 9122

TOPSOIL GRADING

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Perform topsoil grading required to prepare site for installation of landscaping as described in Contract Documents.
   2. Perform topsoil placement and finish grading work required to prepare site for installation of landscaping as described in Contract Documents.
   3. Furnish and apply soil amendments as described in Contract Documents.

B. Related Requirements:
   1. Section 31 0500: ‘Common Earthwork Requirements’:
   2. Section 31 1413: ‘Topsoil Stripping And Stockpiling’.
   3. Section 31 2200: ‘Grading’.
   4. Section 32 9001: 'Common Planting Requirements':
      a. Pre-installation conference held jointly with other common planting related sections.
   5. Section 32 9120: ‘Topsoil And Placement’.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:
   1. Participate in MANDATORY pre-installation conference as specified in Section 32 9001.
   2. In addition to agenda items specified in Section 01 3000, review the following:
      a. Review compost requirements to be within acceptable range as per Attachment 'Compost Quality Guidelines For Landscaping' and 'Compost Verification Report' in this specification.
      b. Review soil fertility amendments and fertilizer requirements as per Attachment 'Topsoil Testing Report' in Section 32 9120.

1.3 SUBMITTALS

A. See Section 01 3000-Administrative Requirements, for submittal procedures. Submittals may be included in more than one submittal group listed below.

C. Submittals for Review:
   1. Do not commence work or deliver products to site until Landscape Architect approves submittals for review.
   2. Product Data:
      a. Soil Amendments and Fertilizer:
         1) Soil amendment and fertilizer literature and chemical / nutrient analysis.
         2) Proposed application rates necessary to bring topsoil up to specified requirements.
         3) Product source location.
   3. Samples:
      a. Soil Amendments and Conditioners:
         1) 2.5 lb sample for each product delivered in resealable plastic bag(s).
   4. Testing And Evaluation Reports:
      a. ‘Compost Verification Report’:
         1) Signed copy certifying compost meets requirements of this specification
            (a) Access 'Compost Verification Template' through:
               (1) https://aec.churchofjesuschrist.org/aec/design_guidelines/
               (2) Go to the Landscape sub-section.

D. Submittals for Information:
    1. Soil Fertility Amendments and Fertilizer:
        a. Upon request submit delivery slips indicating amount of soil amendments, compost, conditioner, and fertilizer delivered to Project site.

E. Submittals for Project Closeout:
    1. Landscape Management Plan (LMP):
        a. Landscape Section. Include the following:
            1) Signed final Compost Verification Report.

PART 2 PRODUCTS

2.1 MATERIALS

A. Soil Amendments:
    1. Incorporate following soil amendments into topsoil used for Project:
        a. Acceptable Soil Amendments, Soil Conditioners, And Application Rates. (Choose one):
            1) Soil Pep'.
            2) 'Compost'
            3) Other amendments and conditioners as specified by 'Topsoil Testing Report' such as lime, gypsum, Axis, etc.
            4) Substitutions: See Section 01 6000-Product Requirements.
                (a) Equal as approved by Landscape Architect prior to bid.
        b. Acceptable Fertilizers And Application Rates:
            1) As specified by Topsoil Testing Report

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:
    1. Do not commence work of this Section until imported, stockpiled and in place topsoil are placed as specified in Section 32 9120 'Topsoil And Placement'.

3.2 PREPARATION

A. Protection Of In-Place Conditions:
    2. Protect utilities and site elements from damage.

B. Surface Preparation:
    1. Surfaces that meet specified topsoil elevations.
        a. Seven (7) days maximum before beginning seeding and planting:
            1) Loosen topsoil 6 inch (150 mm) deep, dampen thoroughly, and cultivate to properly break up clods and lumps.
            2) Rake area to remove clods, rocks, weeds, roots, debris or other material 1-1/2 inches (38 mm) or more in any dimension.
            3) Grade and shape landscape area to bring surface to true uniform planes free from irregularities and to provide drainage and proper slope to catch basins.
    2. Addition of Soil Amendments:
        a. Add specified soil amendments at specified rates to topsoil as directed by Topsoil Testing Report found in Section 32 9120 'Topsoil And Placement'.
        b. Add specified fertilizers at specified rates into topsoil as directed by Soil Testing Laboratory.
        c. Roto-till or otherwise mix soil amendments evenly into topsoil.
        d. Incorporate and leach soil amendments which require leaching, such as gypsum, within such time limits that soil is sufficiently dry to allow proper application of fertilizer and soil conditioners.

3.3 PERFORMANCE

A. General:
   1. Limit use of heavy equipment to areas no closer than 6 feet (1.80 meter) from building or other permanent structures. Use hand held tillers for preparation of subsoil in areas closer than 6 feet (1.80 m).
   2. Do not expose or damage existing shrub or tree roots.

C. Finish Grade Tolerances (As shown on General Planting Details in Contract Documents):
   1. Finish topsoil grade of planting areas before planting and after addition of soil additives shall be specified distances below top of adjacent pavement of any kind:
      a. Ground Cover Areas: 2 inches (50 mm) below.
      b. Seeded Areas: One inch (25 mm) below.
      c. Sodded Areas: 2 inches (50 mm) below.
      d. Tree and Shrub Areas (not individual trees): 4 inches (100 mm) below.

D. Placed Topsoil:
   1. At locations where topsoil has been placed as per Section 32 9120 'Topsoil And Placement', perform the following:
      a. Remove existing vegetation as required in preparation for new landscaping.
      b. Remove organic material, rocks and clods greater than 1-1/2 inch (38 mm) in any dimension, and other objectionable materials.

E. Grading:
   1. Coordinate grading as described in Section 32 9120 'Topsoil And Placement'.

F. Immediately before planting lawn and with topsoil in semi-dry condition, roll areas that are to receive lawn in two directions at approximately right angles with water ballast roller weighing 100 to 300 lbs (45 to 135 kg), depending on soil type.

G. Rake or scarify and cut or fill irregularities that develop as required until area is true and uniform, free from lumps, depressions, and irregularities.

3.4 PROTECTION

A. After landscape areas have been prepared, take no heavy objects over them except lawn rollers.

END OF SECTION

SECTION 32 9223

SODDING

PART 1 GENERAL

1.1 SUMMARY

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

1.2 RELATED REQUIREMENTS

A. Section 32 9001: Common Planting Requirements:
   2. Pre-installation conference held jointly with other common planting related sections.

B. Section 32 9120: 'Topsoil And Placement'.

C. Section 32 9122: 'Topsoil Grading'.

1.3 REFERENCES

A. TPI (SPEC) Certificate: Certify grass species and location of sod source.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:
   1. Participate in pre-installation conference as specified in Section 32 9001.

1.5 SUBMITTALS

A. Submittals for Information:
   2. Sod Seed Mix:
      a. Written certification confirming sod seed mix and quality:
         1) Include species used.
         2) Include supplier name and contact information.

B. Submittals for Closeout:
   1. Operations And Maintenance Data:
      a. Sod Seed Mix.
   2. Landscape Management Plan (LMP):
      a. Landscape Section:
         1) Sod Seed Mix.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Approval Requirements:
   1. Harvest, deliver, store, and handle sod in accordance with requirements of Turfgrass Producers International (TPI) (formally American Sod Producers Association) Specifications for Turfgrass Sod Materials and Transplanting / Installing.
   3. Schedule deliveries to coincide with topsoil operations and laying. Keep storage at job site to minimum without causing delays.
      a. Deliver, unload, and store sod on pallets within 24 hours of being lifted.
      b. Do not deliver small, irregular, or broken pieces of sod.

C. Storage And Handling Requirements:
   1. Cut sod in pieces approximately 3/4 to one inch (19 to 25 mm) thick. Roll or fold sod so it may be lifted and handled without breaking or tearing and without loss of soil.
   2. During wet weather, allow sod to dry sufficiently to prevent tearing during lifting and handling.
   3. During dry weather, protect sod from drying before installation. Water as necessary to insure vitality and to prevent excess loss of soil in handling. Sod that dries out before installation will be rejected.

PART 2 PRODUCTS

2.1 MATERIALS

A. Description:
   1. Superior sod grown from certified, high quality, seed of known origin or from plantings of certified grass seedlings or stolons:
      a. Assure satisfactory genetic identity and purity.
      b. Assure over-all high quality and freedom from noxious weeds or an excessive amount of other crop and weedy plants at time of harvest.
   2. Sod shall be composed of three separate varieties. Varieties should include the following attributes:
      a. High traffic tolerance.
      b. Superior color.
      c. Low-water requirement.
      d. Drought tolerance.

PART 3 EXECUTION

3.1 INSTALLATION

A. Interface With Other Work:
   1. Do not commence work of this Section until work of Sections 32 9122 and 32 9300 has been completed and approved.

B. Tolerances:
   1. Final grade of soil after sodding of lawn areas is complete shall be one inch (25 mm below top of adjacent pavement of any kind.

C. Laying of Sod:
   1. Lay sod during growing season and within 48 hours of being lifted.
   2. Lay sod while top 6 inches (150 mm) of soil is damp, but not muddy. Sodding during freezing temperatures or over frozen soil is not acceptable.
   3. Lay sod in rows perpendicular to slope with joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with a sharp knife.
   4. Lay sod flush with adjoining existing sodded surfaces.
   5. Do not sod slopes steeper than 3:1. Consult with Architect for alternate treatment.

D. After Laying of Sod Is Complete:
   1. Roll horizontal surface areas in two directions perpendicular to each other.
   2. Repair and re-roll areas with depressions, lumps, or other irregularities. Heavy rolling to correct irregularities in grade will not be permitted.
   3. Water sodded areas immediately after laying sod to obtain moisture penetration through sod into top 6 inches (150 mm) of topsoil.

3.2 FIELD QUALITY CONTROL

A. Field Inspection:
   1. Sodded areas will be accepted at Project closeout if:
      a. Sodded areas are properly established.
      b. Sod is free of bare and dead spots and is without weeds.
      c. No surface soil is visible when grass has been cut to height of 2 inches (50 mm).
   2. Sodded areas have been mowed a minimum of twice.

END OF SECTION