PROJECT MANUAL
including Specifications

NEW CANOPY

FOR

AMERICAN FORK DESERET INDUSTRIES

435 South 500 East
American Fork, UT 84003

Property No. 559760917080101

October 2017

Prepared By:

RVA ARCHITECTS., INC.

32 West Center St. Suite #203
Provo, Utah 84601
(801) 374-2100

PROJECT DIRECTORY

Owner:	Corporation of the Presiding Bishop of the Church of Jesus Christ of Latter-day Saints A Utah Corporation Sole 50 East North Temple Street Salt Lake City, UT 84150
Facilities Manager:	American Fork FM Group P.O. Box 1034 American Fork, UT 84003 801-763-2096
Architect:	RVA Architects, Inc. 32 West Center St., #203 Provo, UT 84601 801-374-2100
Electrical:	Royal Engineering 1837 S. East Bay Blvd. Provo, Utah 84606 801-375-2228
Canopy:	Precision Canopy 1497 W. 40 S. Lindon, UT 84042 800-924-2580

End of Project Directory

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FACILITY CONSTRUCTION SUBGROUP

INVITATION TO BID (U.S.)

1. CONTRACTORS INVITED TO BID THE PROJECT:

Dynamic Construction
Majestic Builders
Painter Construction
SRFCO

2. PROJECT:

American Fork Deseret Industries Canopy

3. LOCATION:

435 South 500 East
American Fork, UT 84003

4. OWNER:

Corporation of the Presiding Bishop of
The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole
c/o
American Fork PM Office
110 E. Main St.
American Fork, UT 84003

5. CONSULTANT:

RVA Architects, Inc.
32 W. Center St. #203
Provo, UT 84601

6. DESCRIPTION OF PROJECT:

A. New 42' x 90' free-standing canopy structure.

B. Products or systems may be provided under a Value Managed Relationship (VMR) the Owner has negotiated with the supplier. VMR products and systems are indicated as such in the Specifications.

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

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

9. PRE-BID CONFERENCE: A Pre-Bid Conference will be held on **Friday, November 3, 2017 @ 11:00 am** at the job site located at 435 South 500 East American Fork, UT.

10. BID OPENING: Sealed bids will be received until 11:00 am on Tuesday, November 14, 2017 @ the Alpine Tabernacle located at 110 E. Main St. American Fork, UT. Bids will be opened at that time.

11. BIDDING DOCUMENTS:

A. Bidding Documents may be examined at the following plan room locations:
1) Mountainland Area Plan Room @ mapronline.com

2)McGraw Hill Dodge @ dodgeprojects.construction.com

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

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

END OF DOCUMENT

INSTRUCTIONS TO BIDDERS (U.S.)

1. DOCUMENTS:

A. Bidding Documents include Bidding Requirements and proposed Contract Documents. Proposed Contract Documents consist of:
   1) Contractor Bid Proposal and Project Agreement (U.S.)
   2) Other documents included by reference
   3) Addenda.

B. Bidding Requirements are those documents identified as such in proposed Project Manual.

C. Addenda are written or graphic documents issued prior to execution of the Contract which modify or interpret the Bidding Documents. They become part of the Contract Documents as noted in the Contractor Bid Proposal and Project Agreement (U.S.) upon execution of the Agreement by Owner.

2. BIDDER'S REPRESENTATIONS:

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

3. BIDDING DOCUMENTS:

A. Copies
   1) Owner will provide the Bidding Documents as set forth in the Invitation to Bid.
   2) Partial sets of Bidding Documents will not be issued.

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

C. Substitutions and Equal Products
   1) Equal products may be approved upon compliance with Contract Document requirements.
   2) Base bid only on materials, equipment, systems, suppliers or performance qualities specified in the Bidding documents.
   3) Where a specified product is identified as a "quality standard", products of other manufacturers that meet the performance, properties, and characteristics of the specified "quality standard" may be used without specific approval as a substitute.

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

4. BIDDING PROCEDURES:

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

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

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

5. CONSIDERATION OF BIDS:

A. Opening Of Bids - See Invitation to Bid.

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

6. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:

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

7. MISCELLANEOUS:

A. Pre-Bid Conference. A pre-bid conference at 11:00 am, Friday, November 3, 2017 at the job site located at 435 South 500 East American Fork, UT.

B. Examination Schedule for Existing Building and Site
   1) Brandon Mortensen @ 801-763-2096

END OF DOCUMENT

CONSTRUCTION MATERIAL ASBESTOS STATEMENT (U.S.)

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

Building Name: American Fork Deseret Industries

Building Plan Type: Canopy

Building Address: 435 South 500 East American Fork, UT

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

Project Number: 559760917080101

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

RVA Architects
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

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

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

1. **Property/Project.**

Property/Project Number:	559760917080101
Property Address ("Project Site"):	435 South 500 East American Fork, UT
Project Type:	Canopy
Project Name ("Project"):	American Fork Deseret Industries
Stake Name:	Welfare

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

3. **Contract Documents.** Contract Documents consist of:
   a. This Agreement;
   b. Supplementary Conditions for Bid Proposal and Project Agreement (U.S.);
   c. The Specifications (Division 01 and Divisions 03, 05, 09, 26, 31, 32);
   d. Drawings entitled and dated _____;
   e. Addendum No. with date(s) _____; and
   f. All written Field Changes, written Construction Change Directives and written Change Orders when prepared and signed by Owner and Contractor.

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

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

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

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

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

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

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

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

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

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

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

13. **Independent Contractor Relationship.** The parties expressly agree that Contractor is not an agent or employee of Owner but is an independent contractor solely responsible for all expenses relating to Contractor's business.

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

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

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

17. **Public Statements Regarding Work or Property.** Contractor will not make any statements or provide any information to the media about the Work or Property without the prior written consent of Owner. If Contractor receives any requests for information from media, Contractor will refer such requests to Owner.

18. **No Commercial Use of Transaction or Relationship.**
    a. Without the prior written consent of Owner, which Owner may grant or withhold in its sole discretion, neither Contractor nor Contractor's affiliates, officers, directors, agents, representatives, shareholders, members, Subcontractors, or employees shall make any private commercial use of their relationship to Owner or the Work or Property, including, without limitation:
        1) By referring to this Agreement, Owner, or the Work or Property verbally or in any sales, marketing or other literature, letters, client lists, press releases, brochures or other written materials except as may

be necessary for Contractor to perform Contractor's obligations under the terms of this Agreement;

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

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

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

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

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

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

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

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

24. **Assignment of Contract.** The parties hereto will not assign any rights or obligations under this Agreement without the prior written consent of the other party.

25. **Integration Clause.** The Contract Documents reflect the full agreement of the parties with respect to the Project and the Work and supersede all prior discussions, agreements, and representations regarding the subject matter of the Contract Documents. The Contract Documents may be amended only in a written document signed by both parties hereto.

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

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

28. **Bid Proposal/Agreement.** Contractor's submission to Owner of this agreement signed by Contractor will constitute Contractor's offer and bid proposal to perform the Work described in this agreement according to the terms thereof. Owner's signing of this agreement and delivery to Contractor of a signed copy will constitute acceptance of Contractor's offer and will convert this document to a binding agreement.

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

OWNER:	**CONTRACTOR:**
Corporation of the Presiding Bishop of The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole.	(company)
Signature:	Signature:
Print Name:	Print Name:
Title:	Title:
Address: Meetinghouse Project Management Office 50 E. North Temple Street, 4WW Salt Lake City, UT 84150-0304	Address:
Telephone No: 801-240-3174	Telephone No:
Facsimile No: 801-240-4956	Facsimile No:
Email: klstoddard@ldschurch.org	Email:
Effective Date:	Fed. I.D. or SSN:
	License No:
Reviewed By:	Date Signed:

SUPPLEMENTARY CONDITIONS

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

ITEM 1 - GENERAL

1. Conditions of the Contract apply to each Division of the Specifications.

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

ITEM 2 - LIQUIDATED DAMAGES PAYABLE TO OWNER

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

Delay in Completion of the Work. For each day after the expiration of the designated Time of Completion that Contractor has not completed the Work, Contractor will pay Owner the amount of Five Hundred dollars ($500.00) 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 Bid Proposal and Project Agreement:

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

2. The Owner's tax exempt number is 11871701-002-STC.

UTAH NOTICE OF INTENT TO OBTAIN FINAL COMPLETION:

Add the following to the Bid Proposal and Project Agreement:

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

UTAH NOTICE OF COMPLETION:

Add the following to the Bid Proposal and Project Agreement:

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

UTAH STATE PROGRESS PAYMENTS AND FINAL PAYMENT:

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

5. <u>Payment</u>

a. If the Contractor's Bid Proposal Amount is over $100,000.00, Contractor will submit to Owner a schedule of values which allocates the Contractor's Bid Proposal Amount to various portions of the Work. This schedule, when accepted by Owner, will be used as a basis for reviewing Contractor's payment requests.

b. Progress Payments: Not more than once each month, Contractor will submit a payment request to Owner. Owner will pay Contractor progress payments for work completed within fifteen (15) days after Owner receives:
    1. Contractor's progress payment request for work to date;
    2. A certification by Contractor that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the current payment request; and
    3. Conditional Waiver and Release Upon Progress Payment documents submitted by Contractor (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's progress payment request.

c. Final Payment: Owner will make full and final payment of the Contract Sum due within thirty (30) days of the completion of all of the following requirements:
    1. Contractor has submitted its final payment request;
    2. Contractor has submitted a certification that Contractor has paid for all labor, materials, and equipment relating to the Work covered by prior payment requests and that Contractor will pay for all labor, materials, and equipment relating to the Work covered by the final payment request; and
    3. Contractor has submitted Waiver and Release Upon Final Payment documents (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's final payment request.

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

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

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

e. Upon receipt of any payment from Owner, Contractor will pay to each Subcontractor the amount paid to Contractor on account of such Subcontractor's portion of the Work.

f. Contractor will maintain a copy of each payment request at the Project site for review by the Subcontractors.

g. No payment made, either in whole or in part, by Owner will be construed to be an acceptance of defective or improper materials or workmanship.

END OF DOCUMENT

DIVISION 01

SECTION 01 0000

GENERAL REQUIREMENTS: R&I PROJECT

SECTION 01 1000 SUMMARY

A. Provisions contained in Division 01 apply to all other sections and divisions of Specifications. All instructions contained in Specifications are directed to Contractor. Unless specifically provided otherwise, all obligations set forth in Specifications are obligations of Contractor.

B. Comply with applicable laws and regulations.

C. Owner may provide furnishings and/or equipment for Project. Contractor will receive, store, and protect such items on site until the date Owner accepts Project.

D. Work by Owner: Owner may furnish and install some portions of the Work with its own forces. Complete the Work necessary to accommodate the Work to be performed by Owner before scheduled date for performance of such Work.

SECTION 01 1200 MULTIPLE CONTRACT SUMMARY

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

SECTION 01 1400 WORK RESTRICTIONS

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

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

B. Existing Facilities:
   1. Owner will occupy existing building. Reasonably accommodate use of existing facilities by Owner.

SECTION 01 2100 ALLOWANCES

A. Include following Allowance in bid:
   1. Precision Canopy fee of $69,768.87.
      a. 50% down payment will be required prior to purchasing materials and fabrication.
      b. 30% progress payment will be required prior to shipping.
      c. Balance due upon completion of Precision Canopy's scope of work. Any balance owed 30 days from invoice will incur interest at 15% APR.
      d. Photos of complete area of install and surrounding area will be required prior to shipping.

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

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

SECTION 01 3000 ADMINISTRATIVE REQUIREMENTS

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

SECTION 01 3100 PROJECT MANAGEMENT AND COORDINATION

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

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

SECTION 01 3300 SUBMITTAL PROCEDURES

A. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently before performance of related construction activities to avoid delay.

B. Allow sufficient review time so installation will not be delayed by time required to process submittals.

C. Place permanent label or title block on each submittal for identification. Include name of entity that prepared each submittal on label or title block.

D. Package each submittal appropriately for transmittal and handling.

SECTION 01 3500 SPECIAL PROCEDURES

A. Hot Work Permit (Available from Owner's Representative):
   1. Required for doing hot work involving open flames or producing heat or sparks such as:
      a. Brazing.
      b. Cutting.
      c. Grinding.
      d. Soldering.
      e. Thawing pipe.
      f. Torch applied roofing.
      g. Welding.

SECTION 01 4000 QUALITY REQUIREMENTS

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

B. Conflicting Requirements: If compliance with two or more standards is specified and standards establish different or conflicting requirements for minimum quantities or quality levels, comply with most stringent requirement.

C. Minimum Quantity or Quality Levels: Quantity or quality level shown or specified shall be the minimum provided or performed. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits.

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

E. Quality Control Services: Quality Control will be sole responsibility of Contractor. Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements performed by Contractor. They do not include inspections, tests or related actions performed by Architect or Owner Representative, governing authorities or independent agencies hired by Owner or Architect. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor:
   1. Where services are indicated as Contractor's responsibility, engage qualified Testing Agency to perform these quality control services:
      a. Contractor will not employ same testing entity engaged by Owner, without Owner’s written approval.

F. Notify Owner immediately if asbestos-containing materials or other hazardous materials are encountered while performing the Work.

G. Submit to Owner permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records establishing compliance with standards and regulations bearing upon performance of the Work.

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

SECTION 01 4301 QUALITY ASSURANCE - QUALIFICATIONS

A. Qualifications: Qualifications in this Section establish minimum qualification levels required; individual Specification Sections specify additional requirements:
   1. Fabricator / Supplier / Installer Qualifications:
      a. Firm experienced in producing products similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units:
         1) Where heading *'VMR (Value Managed Relationship) Suppliers / Installers*' is used to identify list of specified suppliers or installers, Owner has established relationships that extend beyond requirements of this Project. No other suppliers / installers will be acceptable. Follow specified procedures to preserve relationships between Owner and specified suppliers / installers and advantages that accrue to Owner from those relationships.
         2) Where heading 'Acceptable or Approved Suppliers / Installers / Fabricators' is used to identify list of specified suppliers / installers / fabricators, use only one of listed suppliers / installers / fabricators. No others will be acceptable.
   2. Factory-Authorized Service Representative Qualifications:
      a. Authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
   3. Installer Qualifications:
      a. Firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with record of successful in-service performance.
   4. Manufacturer Qualifications:
      a. Firm experienced in manufacturing products or systems similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units.
   5. Manufacturer's Field Services Qualifications:
      a. Experienced authorized representative of manufacturer to inspect field-assembled components and equipment installation, including service connections.
   6. Professional Engineer Qualifications:
      a. Professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated:
         1) Engineering services are defined as those performed for installations of system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
   7. Specialists:
      a. Certain sections of Specifications require that specific construction activities will be performed by entities who are recognized experts in those operations:
         1) Specialists will satisfy qualification requirements indicated and will be engaged for activities indicated.
         2) Requirement for special will not supersede building codes and regulations governing the Work.
   8. Testing Agency Qualifications:
      a. Independent Testing Agency with experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
      b. Testing Laboratory:
         1) AASHTO Materials Reference Laboratory (AMRL) Accreditation Program.
         2) Cement and Concrete Reference Laboratory (CCRL).
         3) Nationally Recognized Testing Laboratory (NRTL): Nationally recognized testing laboratory according to 29 CFR 1910.7.
         4) National Voluntary Laboratory (NVLAP): Testing Agency accredited according to National Institute of Standards and Technology (NIST) Technology Administration, U. S. Department of Commerce Accreditation Program.

SECTION 01 4523 TESTING AND INSPECTION SERVICES

A. Submittals:
   1. Certificates: Testing Agency will submit certified written report of each inspection, test, or similar service.

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

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

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

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

D. Tests And Inspections - General:
1. Testing specifically identified to be conducted by Owner, will be performed by an independent entity and will be arranged and paid for by Owner.
2. Individual Sections in Division 01 through Division 50 indicate if Owner will provide testing and inspection of the Work of that Section.
3. Owner may engage additional consultants for testing, air balancing, commissioning, or other special services:
   a. Activities of any such Owner consultants are in addition to Contractor testing of materials or systems necessary to prove that performance is in compliance with Contract requirements.
   b. Contractor must cooperate with persons and firms engaged in these activities.
4. Tests include but not limited to those described in detail in 'Field Quality Control' in Part 3 of Individual Sections in Divisions 01 through Division 50.
5. Taking Specimens:
   a. Only testing laboratory shall secure, handle, transport, or store any samples and specimens for testing.
6. Scheduling Testing Agency:

a. Contractor will coordinate the Work and facilitate timeliness of such testing and inspecting services so as not to delay the Work.
b. Contractor will notify Testing Agency and Architect or Owner Representative to schedule tests and / or inspections.

E. Testing Agency Services And Responsibility:
1. Testing Agency, including independent testing laboratories, will be licensed and authorized to operate in jurisdiction in which Project is located:
   a. Approved Testing Agency Qualifications: Requirements of Section 01 4301 apply.
2. Testing and Inspection Services:
   a. Testing Agency will not release, revoke, alter, or increase Contract Document requirements or approve or accept any portion of the Work.
   b. Testing Agency will not give direction or instruction to Contractor.
   c. Testing Agency will have full authority to see that the Work is performed in strict accordance with requirements of Contract Documents and directions of Owner's Representative and/or Architect.
   d. Testing Agency will not provide additional testing and inspection services beyond scope of the Work without prior approval of Owner's Representative and/or Architect.
3. Testing Agency Duties:
   a. Independent Testing Agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual specification Sections will cooperate with Architect or Owner Representative and Contractor in performance of its duties and will provide qualified personnel to perform required inspections and tests.
   b. Testing Agency will test or obtain certificates of tests of materials and methods of construction, as described herein or elsewhere in technical specification.
   c. Testing Agency will provide management, personnel, equipment, and services necessary to perform testing functions as outlined in this section.
   d. Testing Agency must have experience and capability to conduct testing and inspecting indicated by ASTM standards and that specializes in types of tests and inspections to be performed.
   e. Testing Agency will comply with requirements of ASTM E329, ASTM E543, ASTM C1021, ASTM C1077, ASTM C1093, ASTM D3666, ASTM D3740, and other relevant ASTM standards.
   f. Testing Agency must calibrate all testing equipment at reasonable intervals (minimum yearly) with accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.
   g. Welding Procedure Review: Testing Agency will provide review and approval or rejection of all welding procedures to be used and verify compliance with all reference standard requirements.
4. Testing and Inspection Reports:
   a. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
   b. Laboratory Reports: Testing Agency will furnish reports of materials and construction as required, including:
      1) Description of method of test.
      2) Identification of sample and portion of the Work tested:
         (a) Description of location in the Work of sample.
         (b) Time and date when sample was obtained.
         (c) Weather and climatic conditions at time when sample was obtained.
      3) Evaluation of results of tests including recommendations for action.
   c. Inspection Reports:
      1) Testing Agency will furnish "Inspection at Site" reports for each site visit documenting activities, observations, and inspections.
      2) Include notation of weather and climatic conditions, time and date conditions and status of the Work, actions taken, and recommendations or evaluation of the Work.
   d. Reporting Testing and Inspection (Conforming Work):
      1) Submit testing and inspection reports as required within twenty four (24) hours of test or inspection having been performed.
   e. Reporting Testing and Inspection Defective Work (Non-Conforming Work):
      1) Testing Agency, upon determination of irregularities, deficiencies observed or test failure(s) observed in the Work during performance of its services of test or inspection having been performed, will:
         (a) Verbally notify results to Architect, Contractor, and Owner's Representative within one hour of test or inspection having been performed (if Defective Work (Non-Conforming Work) is incorporated into project).

(b) Submit written inspection report and test results as required within twenty four (24) hours of test or inspection having been performed.

f. Final Report:

1) Submit final report of tests and inspections at Substantial Completion, which identify unresolved deficiencies.

F. Architect's Responsibility:

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

G. Field Quality Control:

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

SECTION 01 5000 TEMPORARY FACILITIES AND CONTROLS

A. Owner will provide electric power for construction activities within limits available at existing facility.

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

C. Exercise caution to avoid fire damage: Do not build fires on site.

D. Existing lighting system may be used by Contractor.

E. Contractor will use existing water supply for construction purposes to extent of existing facilities.

F. Existing restroom facilities may be used by Contractor. Clean restrooms and portions of existing building used in accessing restrooms daily. If existing facilities are not usable, provide and maintain temporary sanitary toilet.

G. Erect adequate barricades, warning signs, and lights necessary to protect persons from injury or harm.

H. Contractor is responsible for security of materials, tools, and equipment. Do not permit others to use building keys provided by Owner. Safeguard building and contents while the Work is being performed and secure building when the Work is finished for day.

I. Protect existing trees and plants. Remove and replace vegetation that dies or is damaged beyond repair due to construction activities.

J. Provide temporary enclosures at exterior building openings for security and protection from weather, theft, and vandalism. Erect and maintain dust-proof partitions and enclosures as required to prevent spread of dust and fumes to occupied portions of building.

K. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and reduce possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result:
   1. Avoid use of tools and equipment that produce harmful noise.
   2. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near site.
   3. Protect the Work, materials, apparatus, and fixtures from injury due to weather, theft, and vandalism.

SECTION 01 6100 PRODUCT REQUIREMENTS

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

SECTION 01 6200 PRODUCT OPTIONS

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

2) Class Two: Use specified product / manufacturer or equal product from any manufacturer.
3) Products / manufacturers used will conform to Contract Document requirements.

SECTION 01 6400 OWNER-FURNISHED PRODUCTS

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

SECTION 01 6600 DELIVERY, STORAGE, AND HANDLING REQUIREMENTS

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

B. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

C. Deliver products to site in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

D. Inspect products upon delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.

E. Store products at site in manner that will simplify inspection and measurement of quantity or counting of units.

F. Store heavy materials away from Project structure so supporting construction will not be endangered.

G. Store products subject to damage by elements above ground, under cover in weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

SECTION 01 7000 EXECUTION REQUIREMENTS

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

B. Require installer of each major component to inspect both substrate and conditions under which the Work is to be done:
   1. Notify Owner in writing of unsatisfactory conditions.
   2. Do not proceed until unsatisfactory conditions have been corrected.

C. Provide attachment and connection devices and methods necessary for securing the Work:
   1. Secure the Work true to line and level.
   2. Allow for expansion and building movement.

D. Recheck measurements and dimensions before starting each installation.

E. Where mounting heights are not shown, install individual components at standard mounting heights recognized within industry or local codes for that application. Refer questionable mounting height decisions to Owner for final decision.

F. Cover and protect furniture, equipment, and fixtures from soiling and damage when demolition of the Work is performed in rooms and areas from which such items have not been removed.

G. Completion Inspection:
   1. Upon 100 percent completion of Project, Contractor will request Substantial Completion Inspection.
   2. Owner will conduct Substantial Completion Inspection in presence of Contractor and furnish list of items to be corrected.
   3. Contractor will notify Owner in writing when items have been corrected.

SECTION 01 7400 CLEANING AND WASTE MANAGEMENT

A. Disposal Of Waste:
   1. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in landfill or incinerator acceptable to authorities having jurisdiction:
      a. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
      b. Remove and transport debris in manner that will prevent spillage on adjacent surfaces and areas.
   2. Burning: Do not burn waste materials.
   3. Disposal: Transport waste materials off Owner's property and legally dispose of them.

B. Progress Cleaning:
   1. Keep premises broom-clean during progress of the Work.
   2. During handling and installation, protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from soiling, damage, or deterioration until Substantial Completion.
   3. Clean and maintain completed construction as frequently as necessary throughout construction period.
   4. Remove waste materials and rubbish caused by employees, subcontractors, and contractors under separate contract with Owner and dispose of legally.

C. Final Cleaning:
   1. Clean each surface or unit to condition expected in normal, commercial-building cleaning and maintenance program. Comply with manufacturer's instructions. Remove all rubbish from under and about building and leave building clean and habitable.
   2. In addition to general cleaning noted above, perform cleaning for all trades at completion of the Work in areas where construction activities have occurred.
   3. If Contractor fails to clean up, Owner may do so and charge cost to Contractor.

SECTION 01 7700 CLOSEOUT PROCEDURES

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

B. Preliminary Closeout Review:
   1. When Architect, Owner and Contractor agree that project is ready for closeout, Pre-Substantial Inspection shall be scheduled. Preparation of floor substrate to receive carpeting and any work which could conceivably damage or stain carpet must be completed, as carpet installation will be scheduled immediately following this inspection.
   2. Architect, Owner and Contractor review completion of punch list items. When Owner and Architect confirm that Contractor has achieved Substantial Completion of The Work, Owner, Architect and Contractor will execute Certificate of Substantial Completion that contains:
      a. Punch list of items requiring completion and correction will be created.
      b. Time frame for completion of punch list items will be established, and date for Substantial Completion Inspection shall be set.

C. Substantial Completion Inspection:
   1. When Architect, Owner and Contractor agree that project is ready for Substantial Completion, an inspection is held. Punch list created at Pre-Substantial Inspection is to be substantially complete.
   2. Prior to this inspection, Contractor shall discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups and similar elements.
   3. Architect, Owner and Contractor review completion of punch list items. When Owner and Architect confirm that Contractor has achieved Substantial Completion of The Work, Owner, Architect and Contractor will execute Certificate of Substantial Completion that contains:

a. Date of Substantial Completion.
b. Punch List Work not yet completed, including seasonal and long lead items.
c. Amount to be withheld for completion of Punch List Work.
d. Time period for completion of Punch List Work.
e. Amount of liquidated damages set forth in Supplementary Conditions to be assessed if Contractor fails to complete Punch List Work within time set forth in Certificate.

4. Contractor shall present Closeout Submittals to Architect and place tools, spare parts, extra stock, and similar items required by Contract Documents in locations as directed by Facilities Manager.

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

SECTION 01 7800 CLOSEOUT SUBMITTALS

A. Operations And Maintenance Data: Operations And Maintenance Manual that include:
1. Project Manual:
a. Copy of complete Project Manual including Addenda, Modifications as defined in General Conditions, and other interpretations issued during construction:
(1) Mark these documents to show variations in actual Work performed in comparison with text of specifications and Modifications. Show substitutions, selection of options, and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.
(2) Note related record drawing information and Product Data.
2. Operations and Data:
a. Operations and maintenance submittals required by Contract Documents.
3. Warranty Documentation:
a. Copies of warranties required by Contract Documents.
4. Record Documentation:
a. Certifications required by Contract Documents.
b. Documentation submittals required by Contract Documents.
c. Testing and Inspection Reports required by Contract Documents.

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

C. Project Record Documents:
1. Do not use record documents for construction purposes:
a. Protect from deterioration and loss in secure, fire-resistive location.
b. Provide access to record documents for reference during normal Working hours.
2. Maintain clean, undamaged set of Drawings. Mark set to show actual installation where installation varies from the Work as originally shown. Give particular attention to concealed elements that would be difficult to measure and record at later date.
a. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.

b. Mark new information that is important to Owner, but was not shown on Contract Drawings.
c. Note related Change Order numbers where applicable.

END OF SECTION

SECTION 03 1113

STRUCTURAL CAST-IN-PLACE CONCRETE FORMING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Design, construction, and safety of formwork.
   2. Furnish and install required formwork ready for placing of concrete.
   3. Strip and dispose of formwork.

B. Related Requirements:
   1. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
      a. Tolerances for placing structural concrete.
      b. Pre-installation conference held jointly with other concrete related sections.

1.2 REFERENCES

A. Reference Standards:
   1. American Concrete Institute:
      a. ACI 318-14, 'Building Code Requirements for Structural Concrete and Commentary'.
   2. ASTM International:
      a. ASTM D1751-04 (2013), 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)'.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:
   1. Participate in pre-installation conference as specified in Section 03 3111.

PART 2 - PRODUCTS

2.1 COMPONENTS

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

2.2 ACCESSORIES

A. Form Release Agents:
   1. Unexposed Surfaces Only: Contractor's option.

B. Expansion / Contraction Joints:
   1. 1/2 inch (13 mm) thick.
   2. Manufactured commercial fiber type:
      a. Meet requirements of ASTM D1751.
      b. Type Two Acceptable Products:
         1) Conflex by Knight-Celotex, Northfield, IL www.aknightcompany.com.

2) Sealtight by W R Meadows Inc, Hampshire, IL www.wrmeadows.com.
3) Equal as approved by Architect before installation. See Section 01 6200.

3. Recycled Vinyl:
   a. Light gray color.
   b. Type Two Acceptable Products:
      1) Proflex by Oscoda Plastics Inc, Oscoda, MI www.oscodaplastics.com.
      2) Equal as approved by Architect before Installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 INSTALLATION

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

B. Accessories:
   1. General:
      a. Provide for installation of inserts, templates, fastening devices, sleeves, and other accessories to be set in concrete before placing.
      b. Position anchor bolts for hold-down anchors and columns and securely tie in place before placing concrete.
   2. Expansion Joints:
      a. Install at joints between asphalt and foundation pier where shown on Drawings.

C. Form Removal:
   1. Removal of forms can usually be accomplished in twelve (12) to twenty four (24) hours.
   2. If temperature is below 50 deg F (10 deg C) or if concrete depends on forms for structural support, leave forms intact for sufficient period for concrete to reach adequate strength.
   3. Metal bars or prys should not be used. Use wood wedges, tapping gradually when necessary.

END OF SECTION

SECTION 03 1511

CONCRETE ANCHORS AND INSERTS

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:
   1. Cast-in anchors for concrete.
   2. Concrete anchors and inserts not specified elsewhere.

B. Related Requirements:
   1. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation of cast-in-place anchors and inserts.

1.2 REFERENCES

A. Reference Standards:
   1. ASTM International:
      a. ASTM A307-14, 'Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength'.
      b. ASTM A563-15, 'Standard Specification for Carbon and Alloy Steel Nuts'.
      c. ASTM F1554-15, 'Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength'.
      d. ASTM F3125/F3125-15a, 'Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions'.
   2. International Code Council (IBC):
      a. ICC-ES Reports: 'ES Acceptance Criteria - Concrete Anchor Compendium':(ACC01, 2016).
         1) AC193, 'Acceptance Criteria For Mechanical Anchors in Concrete Elements' (approved Oct 2015).

1.3 QUALITY ASSURANCE

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

1.4 DELIVERY, STORAGE, AND HANDLING

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

B. Storage And Handling Requirements:
   1. Store materials protected from exposure to harmful weather conditions and as directed by Manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufactured Units:
   1. General:
      a. Use hot-dipped galvanized or stainless steel with matching nuts and washers in exterior and moist interior applications unless indicated otherwise on Contract Drawings.
      b. Nut: Conform to requirements of ASTM A563, Grade A, Hex.
      c. Conform to requirements of ASTM F3125/F3125 for chemical, physical and mechanical requirements for quenched and tempered bolts manufactured from steel and alloy steel.
   2. Anchor Bolts:
      a. J-Bolts:
         1) Non-headed type threaded 2 inches (50 mm) minimum conforming to requirements of ASTM F1554, Grade A.
         2) Anchor hook to project 2 inches (50 mm) minimum including bolt diameter.
      b. Headed Bolts:
         1) Headed type threaded 2 inches (50 mm) minimum conforming to requirements of ASTM F1554, Grade A.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Non-Conforming Work:
   1. Remove and replace misplaced or malfunctioning anchors.
   2. Fill empty anchor holes and patch failed anchor locations with high-strength, non-shrink, non-metallic grout acceptable to Architect.
   3. Repair damage to adjacent materials caused by product installation.

3.2 CLEANING

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

3.3 PROTECTION

A. General:
   1. Protect installed products from damage during construction.

END OF SECTION

SECTION 03 2100

REINFORCEMENT BARS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install concrete reinforcement bars as described in Contract Documents.

B. Related Requirements:
   1. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
   2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
   3. Section 03 1113: Structural Cast-In-Place Concrete Forming'.
   4. Section 03 3111: 'Cast-In-Place Structural Concrete' for:
      a. Reinforcement installed in concrete.
      b. Pre-installation conference held jointly with other concrete related sections.

1.2 REFERENCES

A. Association Publications:
   1. American Concrete Institute:
      a. ACI 'Detailing Manual' (2004 Edition).
   2. Concrete Reinforcing Steel Institute (CRSI):
      a. CRSI, 'Manual of Standard Practice' (2009 28th Edition).

B. Reference Standards:
   1. American Concrete Institute:
      a. ACI 117-10: 'Specifications for Tolerances for Concrete Construction and Materials and Commentary' (Reapproved 2015).
      b. ACI 318-14, 'Building Code Requirements for Structural Concrete and Commentary'.
   2. ASTM International (Following are specifically referenced for reinforcement bars testing):
      a. ASTM A615/A615M-16, 'Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement'.

1.3 ADMINISTRATIVE REQUIREMENTS

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

B. Scheduling:
   1. Notify Testing Agency and Architect as directed in Section 03 3053 and Section 03 3111.

1.4 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
    a. Reinforcing placement drawings.

B. Informational Submittals:
1. Certificates:
    a. Mill certificates for mill tests for reinforcing in accordance with ASTM A615/A615M.

C. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    a. Record Documentation:
        1) Testing and Inspection Reports:
            a) Testing Agency Inspection Reports of reinforcement bars.

1.5 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:
1. Comply with provisions of following codes and standards except where more stringent requirements are shown or specified:
    a. American Concrete Institute:
        1) ACI 318, ‘Building Code Requirements for Structural Concrete and Commentary'.
    b. Concrete Reinforcing Steel Institute:
        1) CRSI, 'Manual of Standard Practice'.

B. Qualifications:
1. Throughout progress of the work of this section, provide at least one (1) person who shall be thoroughly familiar with Construction Documents and other applicable specified requirements, completely trained and experienced in necessary skills, and who shall be present at site and shall direct all work performed under this Section:
    a. In actual installation of the work of this Section, use adequate numbers of skilled workmen to ensure installation in strict accordance with approved design.
    b. In acceptance or rejection of work performed under this Section, no allowance will be made for lack of skill on part of workmen.

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

B. Storage And Handling Requirements:
1. Properly protect rebar on site after delivery.

PART 2 - PRODUCTS

2.1 MATERIAL

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

2.2 ACCESSORIES

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

2.3 FABRICATION

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

PART 3 - EXECUTION

3.1 INSTALLATION

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

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

5. Securely anchor and tie reinforcement bars and dowels before placing concrete. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

C. Splices:
   1. Non-Concrete Structural System:
      a. Avoid splices of reinforcement bars at points of maximum stress. Lap bars 60 bar diameters minimum unless dimensioned otherwise on Drawings. Run reinforcement bars continuous through cold joints.
   2. Concrete Structural System:
      a. In beams, slabs, and walls, avoid splices of reinforcement bars at points of maximum stress.
      b. Lap bars as follows:
         1) Compression Splices: 45 bar diameters minimum.
         2) Tension Splices: In accordance with ACI 318 Class B requirements.
         3) No splice shall be less than 20 inches (508 mm).
         4) For epoxy coated rebar, increase lap-splice lengths by 1.5 times those listed above.
      c. In columns, splices in vertical bars are permitted only at floor levels or points of lateral support and shall consist of 45 bar diameter laps.
      d. Run reinforcement bars continuous through cold joints.

D. Tolerances:
   1. Provide following minimum concrete cover for reinforcement as per ACI 318 or ACI 318M. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations:
      a. Concrete cast against and permanently exposed to earth:
         1) Sections other than Slabs: 3 inches (75 mm).
      b. Concrete Exposed to Earth or Weather:
         1) No. 6 and Larger Bars: 2 inches (50 mm).
         2) No. 5 and Smaller Bars: 1-1/2 inches (38 mm).

3.2 FIELD QUALITY CONTROL

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

END OF SECTION

SECTION 03 3111

CAST-IN-PLACE STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install concrete work as described in Contract Documents including:
      a. Quality of concrete used on Project but furnished under other Sections.
      b. Concrete mix information and use admixtures.
      c. Field Quality Control Testing and Inspection requirements for concrete.
      d. Pre-installation conference held jointly with other concrete related sections.
      e. Curing compounds used with concrete.
      f. Compact aggregate base for miscellaneous cast-in-place concrete.
      g. Miscellaneous cast-in-place concrete.

B. Products Installed But Not Furnished Under This Section:
   1. Membrane Concrete Curing.
   2. Pipe bollards.

C. Related Requirements:
   1. Section 01 1200: 'Multiple Contract Summary' for Owner Furnished Testing and Inspecting Services.
   2. Section 01 3100: ‘Project Management and Coordination’ for pre-installation conference.
   3. Section 01 4000: ‘Quality Requirements’ for administrative and procedural requirements for quality assurance and quality control.
   4. Section 01 4301: ‘Quality Assurance – Qualifications’ establishes minimum qualification levels required.
   5. Section 01 4523: ‘Testing and Inspecting Services’ for testing and inspection, and testing laboratory services for materials, products, and construction methods.
   6. Section 01 7800: ‘Closeout Submittals’.
   7. Section 03 1113: ‘Structural Cast-In-Place Concrete Forming’.
   8. Section 03 1511: ‘Concrete Anchors and Inserts’.
   9. Section 03 2100: ‘Reinforcement Bars’.
   10. Section 03 3923: 'Membrane Concrete Curing' for application.
   11. Section 05 1223: 'Structural Steel For Buildings' for furnishing of pipe for pipe bollards.
   12. Section 31 0501: ‘Common Earthwork Requirements’ for:
      a. General procedures and requirements for earthwork.
   13. Section 31 1123: 'Aggregate Base' for installation of aggregate base.
   14. Section 31 2323: 'Fill' for compaction procedures and tolerances.
   15. Furnishing of items to be embedded in concrete specified in Section involved.

1.2 REFERENCES

A. Association Publications:
   1. American Concrete Institute, Farmington Hills, MI www.concrete.org. Abstracts of ACI Periodicals and Publications.
      a. ACI 214.3R-88(97), *'Recommended Practice for Evaluation of Strength Test Results of Concrete*.
      b. ACI 224R-01, ‘*Control of Cracking in Concrete Structures*’.
      c. ACI 224.1R-07, ‘*Causes, Evaluation, and Repair of Cracks in Concrete Structures*’.
      d. ACI 224.2R-92(R2004): ‘*Cracking of Concrete Members in Direct Tension*’.
      e. ACI 224.3R-95(R2013), ‘*Joints in Concrete Construction*’.
      f. ACI 224.4R-13, *'Guide to Design Detailing to Mitigate Cracking'*.

g. ACI 304R-00, *'Guide for Measuring, Mixing, Transporting and Placing Concrete*'.
h. ACI 304.6R-09, *'Guide for the Measure of Volumetric-Measuring & Continuous-Mixing Concrete Equipment*'.
i. ACI 305R-10, '*Guide to Hot Weather Concreting'*.
j. ACI 306R-10, *'Guide to Cold Weather Concreting'*.
k. ACI 309.1R-08, '*Report on Behavior of Fresh Concrete During Vibration'.*
l. ACI 311.4R-05, *'Guide for Concrete Inspection'*.
m. ACI 347R-14, *'Guide to Formwork for Concrete'*.
n. Certifications:
   1) ACI CP-1(16), *'Technical Workbook for ACI Certification of Concrete Field Testing Technician-Grade 1*'.
   2) ACI CP-19(16), *'Technical Workbook for ACI Certification of Concrete Strength Testing Technician'*.

B. Definitions:
1. Cementitious Materials: Portland cement alone or in combination with one or more of following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

C. Reference Standards:
1. American Association of State and Highway Transportation Officials:
   a. AASHTO M 213-01 (2015), 'Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)' (ASTM Designation D1751).
   b. AASHTO T 318-15, 'Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying'.
2. American Concrete Institute
   a. ACI 117-10 (R2015): 'Specifications for Tolerances for Concrete Construction and Materials and Commentary'.
   b. ACI 211.1-91(R2009), 'Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete'.
   c. ACI 301-16, 'Specification for Structural Concrete for Buildings'.
   d. ACI 305.1-14, 'Specification for Hot Weather Concreting'.
   e. ACI 306.1-90 (R2002), 'Standard Specification for Cold Weather Concreting'.
   f. ACI 308.1-11, 'Standard Specification for Curing Concrete'.
   g. ACI 318-14, 'Building Code Requirements for Structural Concrete' (ACI 318) and 'Commentary on Building Code Requirements for Structural Concrete' (ACI 318R).
3. ASTM International:
   a. ASTM A706/A706M-16, 'Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement'.
   b. ASTM C31/C31M-15, 'Standard Practice for Making and Curing Concrete Test Specimens in the Field'.
   c. ASTM C33/C33M-16, 'Standard Specification for Concrete Aggregates'.
   d. ASTM C39/C39M-15a, 'Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens'.
   e. ASTM C94/C94M-16, 'Standard Specification for Ready-Mixed Concrete'.
   f. ASTM C143/C143M-15, 'Standard Test Method for Slump of Hydraulic-Cement Concrete'.
   g. ASTM C150/C150M-16, 'Standard Specification for Portland Cement'.
   h. ASTM C172/C172M-14a, 'Standard Practice for Sampling Freshly Mixed Concrete'.
   i. ASTM C173/C173M-16, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method'.
   j. ASTM C192/C192M-16a, 'Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory'.
   k. ASTM C231/C231M-14, 'Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method'.
   l. ASTM C260/C260M-10a, 'Standard Specification for Air-Entraining Admixtures for Concrete'.
   m. ASTM C330/C330M-14, 'Standard Specification for Lightweight Aggregates for Structural Concrete'.
   n. ASTM C494/C494M-15a, 'Standard Specification for Chemical Admixtures for Concrete.

o. ASTM C496/C496M-11, ‘Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens’.
p. ASTM C567/C567M-14, ‘Standard Test Method for Determining Density of Structural Lightweight Concrete'.
q. ASTM C595/C595M-16, ‘Standard Specification for Blended Hydraulic Cements'.
r. ASTM C618-15, 'Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete'.
s. ASTM C1077-16, 'Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation'.
t. ASTM C1157/C1157M-11, ‘Standard Performance Specification for Hydraulic Cement'.
u. ASTM C1688/C1688M-14a, ‘Standard Test Method for Density and Void Content of Freshly Mixed Pervious Concrete’.
v. ASTM D1751-04(2013), 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)'.
w. ASTM E329-14a: ‘Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.

4. Corps of Engineers:
   a. CRD-C 508 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.
5. International Code Council (IBC) (2015 or latest approved edition):
   a. IBC Chapter 17, ‘Special Inspections And Tests’.
      1) Section 1704, 'Special Inspections And Tests, Contractor Responsibility And Structural Observations'.
      2) Section 1705, ‘Required Special Inspection And Tests’.
         a) Section 1705.2, 'Steel Construction'.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:
   1. Participate in pre-installation conference as specified in Section 01 3100 and held jointly with following sections:
      a. Section 03 1113: 'Structural Cast-In-Place Concrete Forming'.
      b. Section 03 2100: ‘Reinforcement Bars’.
   2. Schedule pre-installation conference prior to placing of footings, installation of foundation forms and reinforcing steel, and installation of anchors, dowels, inserts, and block outs in foundation walls.
   3. In addition to agenda items specified in Section 01 3100, review following:
      a. Set up concrete placement pour card system and verify that all relevant trades have signed off prior to concrete placement.
      b. Obtaining trade sign-offs on each pour card will be responsibility of General Contactor’s foreman or whoever is in charge of ordering concrete.
      c. Pour cards will be turned in to Quality Assurance representative after the work has been completed so that they can be reviewed and filed.
      d. Review installation scheduling, coordination, placement of building concrete, and placement of items installed in and under concrete.
      e. Review concrete installation scheduling, coordination and placement of site concrete and of items installed in concrete.
      f. Review 'Verification of Conditions' requirements.
      g. Review requirements for preparation of subgrade.
      h. Review aggregate base requirements.
      i. Review formwork requirements.
      j. Review approved mix design requirements 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.
         1) Review jointing requirements.
      n. Review safety issues.

o. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
1) Review requirements and frequency of testing and inspections.

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

1.4 SUBMITTALS

A. Informational Submittals:
1. Design Data:
a. Mix Design:
1) Furnish proposed mix design to Architect for review prior to commencement of Work.
a) Include density (unit weight) and void content determined per ASTM C1688/C1688M for fresh mixed properties and per ASTM C140/C140M for hardened concrete properties.
b) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use.
b. Ready-Mix Supplier:
1) Require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job-site for use of Owner or his representatives. Tickets shall show following:
a) Name of ready-mix batch plant.
b) Serial number of ticket.
c) Date and truck number.
d) Name of Contractor.
e) Name and location of Project.
f) Specific class or designation of concrete conforming to that used in Contract Documents.
g) Amount of concrete.
h) Amount and type of cement.
i) Total water content allowed by mix design.
j) Amount of water added at plant.
k) Sizes and weights of sand and aggregate.
l) Time loaded.
m) Type, name, manufacturer, and amount of admixtures used.
n) Design Data.
2) Provide certificates with supporting testing reports verifying compliance with Contract Document requirements and that materials provided are from single source for following:
a) Cement.
b) Aggregate.
c) Fly Ash.
2. Source Quality Control Submittals:
a. Concrete mix design: Submit mix designs to meet following requirements:
1) Proportions:
a) Mix Type A:
(1) 3000 psi (20.68 MPa) minimum at twenty eight (28) days.
(2) Water **/** Cementitious Material: 0.45 to 0.50 by weight.
b) Mix Type F:
(1) 4500 psi (31.03 MPa) minimum at twenty eight (28) days.
(2) Water **/** Cementitious Material: 0.40 maximum by weight.
(3) Use twenty five (25) percent Class F fly ash as part of cementitious material.
(4) Mix Type F should be used for all exterior concrete exposed to freeze/thaw cycles and deicing salts, unless dictated otherwise by site conditions.
(5) For concrete paving, use mix design based upon use of 1-1/2 inches (38 mm) coarse aggregate (about 15 percent).
c) Air Entrainment: Six (6) percent, plus or minus 1-1**/**2 percent for exterior concrete and foundation walls exposed to freeze/thaw cycles.

d) 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.

2) Slump:
a) 4 inch (100 mm) slump maximum before addition of high range water reducer.
b) 8 inch (200 mm) slump maximum with use of high range water reducer.
c) Slump not required for Mix Type F.

3) Admixtures:
a) Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use. Do not use any admixture without Architect's written approval.
b) Mineral: An amount of specified Class F (or Class C where Class F is not available) fly ash not to exceed twenty five (25) percent of weight of cement may be substituted for cement. If substituted, consider fly ash with cement in determining amount of water necessary to provide specified water / cement ratio.
c) Chemical: Specified accelerator or retarder may be used if necessary to meet environmental conditions.
d) Chemical: Special additives to promote rapid drying concrete may be used in interior concrete slabs on grade if necessary to meet construction schedules.

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

B. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
a. Record Documentation:
1) Pour Reports:
a) Provide report that records following information:
b) Date and time of start of pour, Date and time of end of pour, and Date and time of end of finishing procedures.
c) Temperature at start of pour, Temperature at end of Pour, and Maximum temperature during performance of finishing procedures.
d) Wind speed at start of pour, Wind speed at end of pour, and Maximum wind speed during performance of finishing procedures.
e) Humidity at start of pour, Humidity at end of pour, and High and low humidity during performance of finishing procedures.
f) Cloud cover at start of pour, Cloud cover at end of pour, and High and low cloud cover during performance of finishing procedures.
g) Screeding method and equipment used.
2) Testing and Inspection Reports:
a) Testing Agency Testing and Inspecting Reports of concrete.

1.5 QUALITY ASSURANCE

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

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

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:
1. Expansion Joint Filler Material:
a. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage And Handling Requirements:
1. Expansion Joint Filler Material:
a. Store materials in a clean, dry area in accordance with manufacturer's instructions.
b. Protect materials during handling and application to prevent damage.

1.7 FIELD CONDITIONS

A. Ambient Conditions:
1. For Cold Weather and Hot Weather Limitations, see Preparation in Part 3 of this specification.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:
1. Manufacturer Contact List:
a. BASF (Construction Chemicals Division), Cleveland, OH www.master-builders-solutions.basf.us/en-us.
b. Bonsal American, Charlotte, NC www.bonsal.com.
c. Dayton Superior Specialty Chemicals, Kansas City, KS www.daytonsuperiorchemical.com.
d. Euclid Chemical Company, Cleveland, OH www.euclidchemical.com.
e. Fritz-Pak Concrete Admixtures, Dallas, TX www.fritzpak.com.
f. Grace Construction Products, Cambridge, MA www.graceconstruction.com and Grace Canada Inc, Ajax, ON (905) 683-8561.
g. L & M Construction Chemicals, Omaha, NE www.lmcc.com.
h. Larsen Weldcrete by Larsen Products Corp, Rockville, MD www.larsenproducts.com.
i. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com and Sika Canada, Pointe Claire, QC www.sika.ca.
j. Unitex, Kansas City, MO www.unitex-chemicals.com.
k. U S Mix Products Co, Denver, CO www.usspec.com.
l. W R Meadows, Hampshire, IL www.wrmeadows.com.
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. Materials:
1. Table One:

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

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

         a) Table Three:

Aggregates – Other than Flatwork, Size No. 57			
Sieve	Percent Passing	Sieve	Percent Passing
1-1/2 Inch	100	38 mm	100
One Inch	95 - 100	25 mm	95 - 100
1/2 Inch	20 - 60	12 nm	25 - 60
No. 4	0 - 10	4.75 mm	0 - 10
No. 8	0 - 5	2.36 mm	0 - 5

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

         a) Table Four:

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

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

5. Admixtures And Miscellaneous:
   a. Mineral:
      1) Fly Ash: Meet requirements of ASTM C618, Class F (or Class C where Class F is not available) and with loss on ignition (LOI) of three (3) percent maximum.
   b. Chemical:
      1) No admixture shall contain calcium chloride nor shall calcium chloride be used as an admixture. All chemical admixtures used shall be from same manufacturer and compatible with each other.
      2) Air Entraining Admixture:
         a) Meet requirements of ASTM C260/C260M.
         b) Type Two Acceptable Products:
            (1) MasterAir VR 10 (formally MB-VR), Master AE 90 (formally MB-AE) or MasterAir AE 400 (formally EverAir Plus) by BASF.
            (2) Air Mix 200 Series or AEA-92 Series by Euclid.
            (3) Air Plus or Super Air Plus by Fritz-Pak.
            (4) Sika Air by Sika.
            (5) Daravair or Darex Series AEA by W R Grace.
            (6) Equal as approved by Architect before use. See Section 01 6200.
      3) Water Reducing Admixture:
         a) Meet requirements of ASTM C494/C494M, Type A and containing not more than 0.05 percent chloride ions.
         b) Type Two Acceptable Products:
            (1) MasterPozzolith (formerly Pozzolith) Series by BASF.
            (2) Eucon WR 75 or Eucon 91 by Euclid.
            (3) FR-2 or FR-3 by Fritz-Pak.
            (4) Plastocrete 160 by Sika.
            (5) Daracem, WRDA, or MIRA Series by W R Grace.
            (6) Equal as approved by Architect before use. See Section 01 6200.
      4) Water Reducing, Retarding Admixture:
         a) Meet requirements of ASTM C494/C494M, Type D and contain not more than 0.05 percent chloride ions.
         b) Type Two Acceptable Products:
            (1) MasterPozzolith (formerly Pozzolith) Series by BASF.
            (2) Eucon Retarder 75 by Euclid.
            (3) FR-1 or Modified FR-1 by Fritz-Pak.
            (4) Plastiment by Sika.
            (5) Daratard Series or Recover by W R Grace.
            (6) Equal as approved by Architect before use. See Section 01 6200.
      5) High Range Water Reducing Admixture (Superplasticizer):
         a) Meet requirements of ASTM C494/C494M, Type F or G and containing not more than 0.05 percent chloride ions.
         b) Type Two Acceptable Products:
            (1) MasterRheobuild 1000 (formerly Rheobuild 1000) or MasterGlenium (formerly Glenium) Series by BASF.
            (2) Eucon 37 or Eucon 537 by Euclid.
            (3) Supercizer 1 through 7 by Fritz-Pak.
            (4) Sikament 300 by Sika.
            (5) Daracem or ADVA Series by W R Grace.
            (6) Equal as approved by Architect before use. See Section 01 6200.
      6) Non-Chloride, Non-Corrosive Accelerating Admixture:
         a) Meet requirements of ASTM C494/C494M, Type C or E and containing not more than 0.05 percent chloride ions.
         b) Type Two Acceptable Products:
            (1) MasterSet AC 534 (formerly Pozzolith NC 534) or MasterSet AC 122 (formerly Pozzolith122HE) or MasterSet FP 20 (formerly Pozzutec 20+) by BASF.
            (2) Accelguard 80 by Euclid.
            (3) Daraset, Polarset or Lubricon by W R Grace.
            (4) Equal as approved by Architect before use. See Section 01 6200.
      7) Corrosion Inhibiting Admixture:

a) Liquid admixture to inhibit corrosion of steel reinforcement in concrete by introducing proper amount of anodic inhibitor. Admixture shall contain thirty (30) percent calcium nitrite solution and shall be used where called for in specifications or on drawings.
b) Type Two Acceptable Products:
(1) Eucon CIA by Euclid.
(2) DCI or DCI-S by W R Grace.
(3) Equal as approved by Architect before use. See Section 01 6200.

8) Alkali-Silica Reactivity Inhibiting Admixture:
a) Specially formulated lithium nitrate admixture for prevention of alkali-silica reactivity (ASR) in concrete. Admixture must have test data indicating conformance to ASTM C1293.
b) Type Two Acceptable Products:
(1) Eucon Integral ARC by Euclid.
(2) RASIR by W R Grace.
(3) Equal as approved by Architect before use. See Section 01 6200.

9) Viscosity Modifying Admixture (VMA):
a) Liquid admixture used to optimize viscosity of Self-Consolidating Concrete (SCC). Subject to compliance with requirements, provide following at dosage rates per manufacturer's recommendation.
b) Type Two Acceptable Products:
(1) Visctrol by Euclid.
(2) VMAR3 by W R Grace.
(3) Equal as approved by Architect before use. See Section 01 6200.

10) Shrinkage Reducing Admixture (SRA):
a) Liquid admixture specifically designed to reduce drying shrinkage and potential for cracking.
b) Type Two Acceptable Products:
(1) Eucon SRA by Euclid.
(2) Eclipse 4500 (exterior concrete) by W R Grace.
(3) Eclipse Floor 200 (interior concrete) by W R Grace.
(4) Equal as approved by Architect before use. See Section 01 6200.

11) Rapid Drying Admixture in Interior Concrete Slabs on Grade:
a) Admixture specifically designed to promote rapid drying of concrete.
b) Type Two Acceptable Products:
(1) Concure Systems Admixture by Consure Systems.
(2) Aridus Admixture by US Concrete.
(3) Equal as approved by Architect before use. See Section 01 6200.

2.2 ACCESSORIES

A. Formwork:
1. Meet requirements specified in Section 03 1113:

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

C. Evaporation Retardant:
1. Type Two Acceptable Products:
a. MasterKure ER 50 (Formerly Confilm) by BASF.

b. Sure Film J-74 by Dayton Superior.
c. Eucobar By Euclid Chemical Co.
d. E-Con by L & M Construction Chemicals.
e. Pro Film by Unitex.
f. U S Spec Monofilm ER by U S Mix Products.
g. Equal as approved by Architect before use. See Section 01 6200.

D. 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 and AASHTO M 213.
2) 1/2 inch (12.7 mm) thick.
3) Resilience:
a) When compressed to half of original thickness, recover to minimum of seventy (70) percent of original thickness.
b. Type Two Acceptable Products:
1) Fiber Expansion Joint by W R Meadows, Hampshire, IL www.wrmeadows.com.
2) Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

A. Concrete Mixing:
1. General:
a. All concrete shall be machine mixed.
b. Water gauge shall be provided to deliver exact predetermined amount of water for each batch.
c. Reliable system must be employed to insure that no less than predetermined amount of cement goes into each batch.
d. Re-tempering partly set concrete will not be permitted.
2. Transit Mix: 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. See ACI 306.1 'Standard Specification for Cold Weather Concreting' for additional requirements.
b. General Requirements:
1) Materials and equipment required for heating and protection of concrete shall be approved and available at Project site before beginning cold weather concreting.
a) Heating devices used to maintain specified temperatures shall have baffle plate above, of sufficient size, and sand bed below, in order to distribute heat.
b) Heating devices shall be so operated that temperature of air immediately below slab forms shall not exceed 100 deg F (37.8 deg C). Provide sufficient and suitable thermometers to verify compliance.
2) Forms, reinforcement, metallic embedments, and fillers shall be free from snow, ice, and frost. Surfaces that will be in contact with newly placed concrete, including sub-grade materials, shall be 35 deg F (2 deg C) minimum at time of concrete placement.
3) Thaw sub-grade 6 inches (150 mm) deep minimum before beginning concrete placement. If necessary, re-compact thawed material.
4) Use no frozen materials or materials containing ice.
5) No salt or other chemical may be used for such protection.
6) Only specified non-corrosive non-chloride accelerator shall be used. Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.
c. Requirements When Average twenty four (24) Hour Temperature, midnight to midnight, Is Below 40 deg F (4.4 deg C):
1) Temperature of concrete as placed and maintained shall be 55 deg F (13 deg C) minimum and 75 deg F (27 deg C) maximum.
2) Heat concrete for seventy two (72) hours minimum after placing if regular cement is used; for 48 hours if high early strength cement is used; or longer if determined necessary by Architect.
a) During this period, maintain concrete surface temperature between 55 and 75 deg F (13 and 27 deg C).
3) Vent flue gases from combustion heating units to outside of enclosure to prevent carbonation of concrete surface.
4) Prevent concrete from drying during heating period. Maintain housing, insulation, covering, and other protection twenty four (24) hours after heat is discontinued.
5) After heating period, if temperature falls below 32 deg F (0 deg C), protect concrete from freezing until strength of 2000 psi (13.79 MPa) minimum is achieved.
a) Protect flatwork exposed to melting snow or rain during day and freezing during night from freezing until strength of 3500 psi (24.13 MPa) minimum is achieved.
d. Requirements When Average twenty four (24) Hour Temperature, midnight to midnight, Is Above 40 deg F (4.4 deg C), but when temperature falls below 32 deg F (0 deg C):
1) Protect concrete from freezing for seventy two (72) hours after placing, or until strength of 2000 psi (13.79 MPa) is achieved, whichever is longer.
2) Protect flatwork exposed to melting snow or rain during day and freezing during night from freezing until strength of 3500 psi (24.13 MPa) minimum is achieved.
e. Protect soil supporting concrete footings from freezing under any circumstances.

4. Hot Weather Concreting Procedures:
a. See ACI 305.1 'Specification for Hot Weather Concreting' for additional requirements.
b. Maximum concrete temperature allowed is 90 deg F (32 deg C) in hot weather.
c. Cool aggregate and subgrades by sprinkling.
d. Avoid cement over 140 deg F (60 deg C).
e. Use cold mixing water or ice.
f. Use fog spray or evaporation retardant to lessen rapid evaporation from concrete surface.

B. Surface Preparation:
1. Earthwork Preparation:
a. Aggregate base and subgrade:
1) Prepare aggregate base as specified in Section 31 1123.
2) Prepare fill subgrade as specified in Section 31 2323.
2. Install inserts, bolts, and other accessories furnished under other Sections to be installed as part of work of this Section:
a. Tie anchor bolts for hold-down anchors and columns securely to reinforcing steel.

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

3.3 INSTALLATION

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

Placing Concrete Rate			
Temperature	Rate of Fill per Hour	Temperature	Rate of Fill per Hour
40 deg F	2 feet	4.4 deg C	600 mm
50 deg F	3 feet	10 deg C	900 mm
60 deg F	4 feet	15.6 deg C	1 200 mm
70 deg F	5 feet	21 deg C	1 500 mm

f. Compact concrete in forms by vibrating and other means where required.
1) Thoroughly consolidate concrete around reinforcing bars.
2) Use and type of vibrators shall conform to ACI 309.
g. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree into landscaped areas.
h. Consolidate concrete thoroughly.
i. Do not embed aluminum in concrete.
j. Do not use contaminated, deteriorated, or re-tempered concrete.
k. Avoid accumulation of hardened concrete.
2. Footings:
a. Bear 12 inches (300 mm) minimum into undisturbed earth or on mechanically compacted engineered fill. Step footings at ratio of 1-1/2 horizontal to One vertical unless detailed otherwise. Exterior wall footing shall bear 36 inches minimum below finish grades.
b. Level top of finish footing and leave rough.
3. Foundations And Walls:
a. Leave steel projecting where required for floor tie.
4. Miscellaneous Concrete Elements:
a. Pipe Bollards:
1) Install plumb and fill with concrete.
5. Bonding Fresh And Hardened Concrete:
a. Re-tighten forms.
b. Roughen surfaces.
c. Clean off foreign matter and laitance.
d. Wet but do not saturate.
e. Slush with neat cement grout or apply bonding agent.
f. Proceed with placing new concrete.
6. Anchor Bolts:
a. Place anchor bolts not tied to reinforcing steel immediately following leveling of concrete. Reconsolidate concrete around bolt immediately after placing bolt.
b. Do not disturb bolts during finishing process.

B. Finishing:
1. Vertical Surfaces:
a. Exposed Foundations:
1) Finish provided by form release / finish agent specified in 03 1113.

2) Repair of Unacceptable Concrete.
   a) Immediately after removing forms, remove joints, marks, bellies, projections, loose materials, and cut back metal ties from surfaces to be exposed.
   b) Point up voids with cement mortar, 1:2 mix, and rub exposed surface with carborundum to smooth, even surface matching surrounding undamaged area.

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

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

Maximum Variation Tolerances		
Thickness, standard	plus 3/8 inch, minus 1/4 inch	plus 9.5 mm, minus 3 mm
Thickness, footings	minus 0 inch	minus 0 mm
Plan, 0 - 20 feet	1/2 inch	12.7 mm
Plan, 40 feet or greater	3/4 inch	19 mm
Plan, footings	plus 1/2 inch	plus 12.7 mm
Eccentricity, footings	2 inch max. standard, 1/2 inch at masonry	50 mm max. standard, 12.7 mm at masonry
Plumb	1/2 inch max.	12.7 mm max.

3.4 FIELD QUALITY CONTROL

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

b) Inspect that all reinforcement bars are be positively identified as to heat number and mill analysis.
c) Confirm surface of reinforcing bars is free of form release oil or other deleterious substances.

3. Concrete:
   a. Testing Agency shall provide testing and inspection for concrete as per ASTM C1077.
   b. Testing Agency will sample and test for quality control during placement of concrete as directed by Architect.
   c. Testing and inspections, if performed, will include following:
      1) Periodic inspection verifying use of required design mix.
      2) Inspection at time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine temperature of concrete.
      3) Inspection of concrete and shotcrete placement for proper application techniques.
      4) Periodic inspection for maintenance of specified curing temperature and techniques.
      5) Periodic inspect of formwork for shape, location and dimensions of concrete member being formed:
         a) Certified Inspector shall inspect forms for general location, configuration, camber, shoring, sealing of form joints, correct forming material, concrete accessories, and form tie locations.
      6) Concrete floor flatness and floor levelness of interior slabs as per ASTM E1155.
      7) Concrete moisture and alkalinity testing. See Section 09 0503 Flooring Substrate Preparation.
   d. Testing Agency will sample and test during placement of concrete as directed by Architect and may include following:
      1) Sampling Fresh Concrete: ASTM C172/C172M, except modified for slump to comply with ASTM C94/C94M:
         a) Slump: ASTM C143/C143M, Test each time set of compressive specimens are made.
         b) Air Content: ASTM C173/C173M, volumetric method for lightweight or normal weight concrete: ASTM C231/C231M, pressure method for normal weight concrete each time set of compression test specimens are made.
         c) Concrete Temperature: Test each time set of compressive specimens are made.
         d) Unit Weight: ASTM C567/C567M, Test each time set of compressive specimens are made.
   e. Compression Test Specimen: ASTM C31/C31M, one (1) set of four (4) standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
   f. Compressive Strength Tests: ASTM C39/C39M:
      1) Obtain one (1) composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd (4 cu m), but less than 50 cu. yd (38 cu m), plus one (1) set for each additional 50 cu. yd (38 cu m) or fraction thereof.
      2) One (1) specimen tested at at seven (7) days, two (2) specimens tested at twenty eight (28) days, and one (1) specimen retained in reserve for later testing if required.
      3) If strength of field-cured cylinders is less than eighty five (85) percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing in-place concrete.
      4) Strength level of concrete will be considered satisfactory if averages of sets of three (3) consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi (3.45 MPa).

B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
   1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.

3.5 CLEANING

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

3.6 PROTECTION

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

B. Curing:
   1. Restrict foot or vehicle traffic as curing membrane dries as recommended be Manufacturer.

END OF SECTION

SECTION 03 3923

MEMBRANE CONCRETE CURING

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:
   1. Quality of membrane concrete curing as described in Contract Documents.

B. Related Requirements:
   1. Section 03 3111: 'Cast-In-Place Structural Concrete' for application of membrane concrete curing.

1.2 REFERENCES

A. Definitions:
   1. Curing: Process by which hydraulic-cement concrete matures and develops hardened properties, over time, as result of continued hydration of cement in presence of sufficient water and heat. Also used to describe action taken to maintain moisture and temperature conditions in freshly placed concrete.

B. Reference Standards:
   1. American Association of State and Highway Transportation Officials:
      a. AASHTO M 148-05, ‘Standard Specification for Liquid Membrane-Forming Compounds for Curing’.
   2. ASTM International:
      a. ASTM C309-11, 'Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete'.

1.3 SUBMITTALS

A. Action Submittals:
   1. Product Data:
      a. Manufacturer's product data.
      b. Material Safety Data Sheets (MSDS).

B. Informational Submittals:
   1. Manufacturer Instructions:
      a. Printed installation instructions.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

B. Storage And Handling Requirements:

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

1.6 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Membrane Concrete Curing:
   1. Description:
      a. Clear water-based, ready-to use, dissipating membrane curing agent that cures freshly placed concrete, forming effective barrier against moisture loss from concrete surface.
   2. Design Criteria:
      a. VOC-compliant compound.
      b. Meet requirements of ASTM C309 and AASHTO M 148, Type 1 or 1-D, Class B.
      c. Interior concrete: containing no mineral spirits, naptha, or other components detrimental to finish flooring installation.
      d. Maintain ninety five (95) percent of mix water present in concrete mass after application.
      e. Gradually dissipate after twenty eight (28) days without leaving stain or discoloring concrete surface.
   3. Horizontal and Vertical Cast-In-Place Structural Concrete:
      a. Type One Acceptable Products.
         1) Exterior and Interior Concrete:
            a) Clear Cure J7WB by Dayton Superior Corporation, Miamisburg. OH www.daytonsuperior.com.
            b) L&M Cure R by L&M Construction Chemicals, Inc. Omaha, NE www.lmcc.com.
            c) Clear Water Resin by Right Point, Dekalb, IL www.rightpointe.com.
            d) 1100-Clear by W. R. Meadows, Inc. Hampshire, IL www.wrmeadows.com.
      b. Equal product meeting design criteria requirements as approved by Architect/Owner's Representative before BID. See Section 01 6200.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 03 6213

NON-METALLIC NON-SHRINK GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install structural grout as described in Contract Documents.
      a. For grout base for structural columns.
      b. For securing anchor bolts and hardware in concrete.

1.2 REFERENCES

A. Association Publications:
   1. American Concrete Institute:
      a. ACI 305R-10, 'Guide to Hot Weather Concreting'.
      b. ACI 306R-10, 'Guide to Cold Weather Concreting'.

B. Reference Standards:
   1. ASTM International:
      a. ASTM C33/C33M-13, 'Standard Specification for Concrete Aggregates'.
      b. ASTM C78/C78M-10, 'Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)'.
      c. ASTM C109/C109M-13, 'Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)'.
      d. ASTM C191-13, 'Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle'.
      e. ASTM C230/C230M-14, 'Standard Specification for Flow Table for Use in Tests of Hydraulic Cement'.
      f. ASTM C266-15, 'Standard Test Method for Time of Setting of Hydraulic-Cement Paste by Gillmore Needles'.
      g. ASTM C293/C293M-10, 'Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading)'.
      h. ASTM C307-03(2012), 'Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings'.
      i. ASTM C309-11, 'Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete'.
      j. ASTM C348-14, 'Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars'.
      k. ASTM C469/C469M-10, 'Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression'.
      l. ASTM C496/C496M-14, 'Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens'.
      m. ASTM C531-00(2005), 'Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes'.
      n. ASTM C579-01(2012), 'Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes'
      o. ASTM C580-02(2012), 'Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes'.
      p. ASTM C666/C666M-15, 'Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing'.
      q. ASTM C827/C827M-10, 'Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures'.

r. ASTM C882/C882M-13a, ‘Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear’.
s. ASTM C939-10, ‘Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)’.
t. ASTM C940-10a, ‘Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory’.
u. ASTM C942-15, ‘Standard Test Method for Compressive Strength of Grouts for Preplaced-Aggregate Concrete in the Laboratory’.
v. ASTM C1090-10, ‘Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout’.
w. ASTM C1107/C1107M-14a, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).'
x. ASTM C1202-12, ‘Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration’.
y. ASTM E488/E488-15, ‘Standard Test Methods for Strength of Anchors in Concrete Elements’.

2. United States Army Corps of Engineers (USACE):
   a. CRD C-621-93, ‘Handbook for Concrete and Cement Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink’.

1.3 SUBMITTALS

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

1.4 DELIVERY, STORAGE AND HANDLING

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

B. Storage And Handling Requirements:
   1. Follow Manufacturer’s recommendations including but not limited to following:
      a. Store in clean, dry location.
      b. Keep containers sealed until ready for use.
      c. Store materials at room temperature before use.
   2. Protect materials during handling and placement to prevent damage or contamination.
      a. Protect materials from freezing or overheating.
   3. Shelf Life: One (1) year minimum in original, unopened containers.

1.5 FIELD CONDITIONS

A. Ambient Conditions:
   1. General:
      a. Do not place grout over frozen concrete.
   2. Maintain environmental conditions and protect Work during and after installation to comply with referenced standards and Manufacturer’s printed recommendations:
      a. Do not install products under environmental conditions outside Manufacturer’s recommendations.
   3. Follow ACI requirements for cold and hot weather concreting or Manufacturer’s written instructions, whichever is more stringent:
      a. Cold Weather Limitations:

1) Follow requirements of ACI 306R for cold weather concreting.

b. Hot Weather Limitations:
1) Follow requirements of ACI 305R for hot weather concreting.

c. ACI 305R-10, 'Guide to Hot Weather Concreting'.

d. ACI 306R-10, 'Guide to Cold Weather Concreting'.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Design Criteria:
1. Description:
a. Commercial non-shrink, non-metallic grout.
2. Meet following requirements:
a. ASTM C1107/C1107M, Type B or Type C.
b. Corps and Engineers CRD C-621.
c. Compressive strength of 6000 psi (41 MPa) minimum.

B. Type Two Acceptable Products:
1. Masterflow 928 by BASF Systems, Shakopee, MN or BASF Canada, Mississauga, ON www.buildingsystems.basf.com.
2. ProSpec F77 by Bonsal American, Inc., Charlotte, NC www.bonsal.com.
3. Advantage 1107 Grout by Dayton Superior Corporation, Oregon, IL www.daytonsuperiorchemical.com.
4. NS Grout by Euclid Chemical Company, Cleveland, OH www.euclidchemical.com.
5. Five Star Grout by Five Star Products Inc, Fairfield, CT www.fivestarproducts.com.
6. Duragrout by L&M Construction Chemicals Inc., Omaha, NE www.lmcc.com.
7. Planigrout 712 by MAPEI Corporation, Deerfield Beach, FL www.mapei.US or Mapei Inc., Laval, QC www.mapei.com/CA.
8. SikaGrout 212 by Sika Corporation, Lyndhurst, NJ www.usa.sika.com or Sika Canada, Inc. Pointe-Claire, QC www.can.sika.com.
9. MP Grout by US Mix Products Company, Denver, CO www.usspec.com.
10. Sealtight CG-86 Grout by W R Meadows, Hampshire, IL www.meadows.com.
11. Equal as approved by Architect before installation. See Section 01 6200.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 APPLICATION

A. General:
   1. Follow Manufacturer's recommended thickness.

B. Mixing:
   1. Mix grout in accordance with Manufacturer's written instructions.
   2. Add mix water in amount in accordance with Manufacturer's written instructions to provide required placing consistency.
   3. Do not add water in amount that will cause bleeding or segregation of mixed grout.
   4. Do not add any sand, cement, admixtures, or fluidifiers to grout.

C. Placement:
   1. Place grout in accordance with Manufacturer's written instruction including but not limited to the following:
      a. Proper curing is required.
      b. Use cold weather or hot weather grouting procedures in accordance with Manufacturer's written instructions, as temperature dictates:
         1) Do not use at temperatures that may cause premature freezing.
         2) Do not allow to freeze until 4000 psi (27.6 MPa) is attained.
      c. Employ cold weather or hot weather grouting practices as temperatures dictates.
   2. Completely eliminate air pockets and provide full contact between grout and item being grouted. Do not exceed Manufacturer's recommended thickness.

D. Curing:
   1. Cure grout in accordance with Manufacturer's written instructions or ACI curing practices.
   2. Wet cure grout until forms are removed.
   3. Seal grout surfaces after forms are removed as recommended by Manufacturer.

E. Keep grout surfaces wet after curing compound has dried for as long as recommended by Manufacturer.

3.4 FIELD QUALITY CONTROL

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

B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
   1. Correct any work found defective or not complying with Contract Document requirements at no additional cost to the Owner.

3.5 CLEANING

A. Use clean water.

B. Clean tools and equipment with water before material hardens.

3.6 PROTECTION

A. Follow Manufacturer's recommendation for protection when applying material.

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

C. Protect placed grout from damage during construction.

END OF SECTION

SECTION 05 0503

SHOP-APPLIED METAL COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Quality of factory or shop-applied priming applied to steel supplied to Project without finish coat.
   2. Quality of and procedures for field touch-up and repair of factory-applied priming and galvanizing.

B. Related Requirements:
   1. Sections under 09 9000 heading: Finish painting.

1.2 REFERENCES

A. Reference Standards:
   1. ASTM International:
      a. ASTM A780/A780M-09(2015), ‘Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings'.
      b. ASTM B695-04(2009), 'Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel'.

PART 2 - PRODUCTS

2.1 FINISHES

A. Factory And Shop-Applied Primer:
   1. Compatible with and of equal or better quality than finish paint system to be applied by Sections under 09 9000 heading.
   2. Primer on unexposed, unfinished surfaces may be fabricator's standard shop coat.

B. Repairs To Primed Surface:
   1. Unless otherwise specified, use primer which matches characteristics of original primer and is compatible with and of equal or better quality than finish paint system to be applied by Sections under 09 9000 heading.

C. Material For Repairs Of Galvanized Surfaces:
   1. Structural, Load-Bearing Items And Items Exposed To Weather:
      a. Zinc-Based Solders, Powder, Or Rod:
         1) Zinc-Cadmium solder with liquidus temperature range from 518 to 527 deg F (270 to 275 deg C), or
         2) Zinc-Tin-Lead alloy with liquidus temperature range from 446 to 500 deg F (230 to 260 deg C).
      b. Sprayed Zinc: Wire, ribbon, or powdered zinc suitable for process.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation:

1. General:
   a. Clean, grind, or otherwise prepare welds in steel that is to be coated within limits acceptable to welder responsible for structural integrity.
   b. Surfaces to be coated shall be clean, dry and free of oil, grease, and corrosion products.
2. Preparation Of Primed, Ungalvanized Surfaces:
   a. Clean welds and grind serious abrasions.
3. Preparation Of Galvanized Surfaces:
   a. Follow requirements of ASTM A780/A780M and following:
   b. For Repair Using Zinc-Rich Paints:
      1) Blast clean surfaces to near-white metal, in accordance with SSPC-SP10 (1 to 2 mil anchor pattern), as minimum.
      2) Where circumstances do not allow blast cleaning, power disk sand to bright metal finish.
      3) Extend surface preparation into undamaged galvanized area.
      4) Remove flux residue and weld spatter from welded areas.
   c. For Repair Using Zinc-Based Alloys:
      1) Clean surface to be reconditioned using wire brush, light grinding action, or mild blasting.
      2) Extend surface preparation into surrounding, undamaged galvanized areas.
      3) Remove flux residue and weld spatter from welded areas.
      4) Preheat cleaned area to at least 600 deg F (316 deg C).
         a) Do not overheat surface beyond 750 deg F (400 deg C) or allow surrounding galvanized coatings to be burned.
         b) Wire brush surface during preheating.
   d. For Repair Using Sprayed Zinc (Metallizing):
      1) Blast clean surfaces to near-white metal, in accordance with SSPC-SP5 as minimum.
      2) Extend surface preparation into undamaged galvanized area.
      3) Remove flux residue and weld spatter from welded areas.

3.2 REPAIR / RESTORATION

A. Repairs To Primed, Ungalvanized Surfaces:
   1. Thoroughly clean metal and give one (1) prime coat of specified material, well-worked into metal joints and open spaces. Match existing primed finish as required.
      a. Do not apply primer at temperatures below 45 deg F (7 deg C).
      b. Protect un-primed machine-finished surfaces against corrosion by priming.

B. Repairs To Galvanized Surfaces:
   1. Structural, Load-Bearing Items And Items Exposed To Weather:
      a. Repair Using Zinc-Based Alloys:
         1) Rub cleaned, pre-heated areas with repair stick to deposit evenly distributed layer of zinc alloy. If powdered zinc alloys are used, sprinkle powder on surface and spread out with spatula or similar tool.
         2) Remove flux residue by rinsing with water or wiping with damp cloth.
      b. Repair Using Sprayed Zinc (Metallizing): Apply 2 mil minimum coating by means of metal-spraying pistols fed with either zinc wire or zinc powder in accordance with requirements of ASTM B695, Type I.
   2. All Items:
      a. Apply repair materials immediately after surface preparation is complete.
      b. Take thickness measurements, with either magnetic or electromagnetic gauge, to ensure applied coating is as specified or agreed to.

END OF SECTION

SECTION 05 1223

STRUCTURAL STEEL FOR BUILDINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:
   1. Structural pipe for bollards.

B. Related Requirements:
   1. Section 03 3111: 'Cast-In-Place Structural Concrete' for installation of bollards.
   2. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of priming.

1.2 REFERENCES

A. Reference Standards:
   1. American Society For Testing And Materials:
      a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.
      b. ASTM A53/A53M-12, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
      c. ASTM A500/A500M-13, 'Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes'.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Materials:
   1. Structural Pipe.
      a. Meet requirements of ASTM A53/A53M, Type E or S, Grade B.
         1) Weight Class, STD, Schedule 40.
   2. Bollards:
      a. Bollards: 6 inch (150 mm) minimum diameter meeting requirements of ASTM A53/A53M, Type E or S, Grade B, Weight Class, STD, Schedule 40.

B. Fabrication:
   1. After fabrication and before shop priming, hot-dip or mechanically galvanize the following:
      a. Bollards.
   2. Shop prime steel provided under this Section.

C. Finishes:
   1. Shop Primer:
      a. Concealed Steel: Fabricator's standard shop coat.
      b. Exposed Steel To Receive Finish: Primer shall be acceptable to Finish Manufacturer.

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 09 9001

COMMON PAINTING AND COATING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Common procedures and requirements for field-applied painting and coating.

B. Related Requirements:
   1. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of shop priming of steel and iron.
   2. Sections under 09 9000 heading ‘Paints and Coatings’.
   3. Section 32 1723: ‘Pavement Marking’.

1.2 REFERENCES

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

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

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

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

1.3 SUBMITTALS

A. Action Submittals:
1. Product Data:
a. Include following information for each painting product, arranged in same order as in Project Manual.
1) Manufacturer's cut sheet for each product indicating ingredients and percentages by weight and by volume, environmental restrictions for application, and film thicknesses and spread rates.
2) Provide one (1) copy of 'MPI Approved Products List' showing compliance for each MPI product specified.
a) MPI Information is available from MPI Approved Products List using the following link: http://www.paintinfo.com/mpi/approved/index.shtml.
3) Confirmation of colors selected and that each area to be painted or coated has color selected for it.

B. Informational Submittals:
1. Manufacturer Instructions:
a. Manufacturer's substrate preparation instructions and application instruction for each painting system used on Project.
2. Qualification Statement:
a. Applicator:
1) Provide Qualification documentation if requested by Architect or Owner.

C. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
a. Record Documentation:
1) Manufacturer's documentation:
a) Manufacturer's cut sheet for each component of each system.
b) Schedule showing surfaces where each system was used.

D. Maintenance Materials Submittals:
1. Extra Stock Materials:
a. Provide painting materials in Manufacturer's original containers and with original labels in each color used. Label each can with color name, mixture instructions, date, and anticipated shelf life.
b. Provide one (1) gallon of each finish coat, primer, and undercoat in each color used.

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approval:
1. Conform to work place safety regulations and requirements of those authorities having jurisdiction for storage, mixing, application and disposal of all paint and related hazardous materials.
2. Paint and painting materials shall be free of lead and mercury, and have VOC levels acceptable to local jurisdiction.
3. Master Painters Institute (MPI) Standards:
a. Products: Comply with MPI standards indicated and listed in 'MPI Approved Products List'.
b. Preparation and Workmanship: Comply with requirements in 'MPI Architectural Painting Specification Manual' for products and coatings indicated.

B. Qualifications:
1. Applicator: Requirements of Section 01 4301 applies, but not limited to following:
a. Minimum five (5) years experience in painting installations.
b. Minimum five (5) satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
c. Maintain qualified crew of painters throughout duration of the Work.
d. Upon request, submit documentation.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:
   1. Deliver specified products in sealed, original containers with Manufacturer's original labels intact on each container.
   2. Deliver amount of materials necessary to meet Project requirements in single shipment.

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

1.6 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 SYSTEMS

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

B. Materials:
   1. Materials used for any painting system shall be from single manufacturer unless approved otherwise in writing by painting system manufacturers and by Architect. Include manufacturer approvals in Product Data submittal.
   2. Linseed oil, shellac, turpentine, and other painting materials shall be pure, be compatible with other coating materials, bear identifying labels on containers, and be of highest quality of an

approved manufacturer listed in MPI manuals. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on Project.

PART 3 - EXECUTION

3.1 APPLICATORS

A. Acceptable Applicators. See Section 01 4301:
   1. Meet Quality Assurance Applicator Qualifications as specified in Part 1 of this specification.

3.2 EXAMINATION

A. Verification Of Conditions:
   1. Directing applicator to begin painting and coating work will indicate that substrates to receive painting and coating materials have been previously inspected as part of work of other Sections and are complete and ready for application of painting and coating systems as specified in those Sections.

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

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

3.3 PREPARATION

A. Protection Of In-Place Conditions:
   1. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following:
      a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.

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

3.4 APPLICATION

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

B. Paint or finish complete all surfaces to be painted or coated as described in Contract Documents, including but not limited to following items.
   1. Paint electrical items that require field painting as indicated in Contract Documents. These include but are not limited to:
      a. Electrical conduit.

C. In multiple coat paint work, tint each succeeding coat with slightly lighter color, but approximating shade of final coat, so it is possible to check application of specified number of coats. Tint final coat to required color.

D. Spread materials smoothly and evenly. Apply coats to not less than wet and dry film thicknesses and at spreading rates for specified products as recommended by Manufacturer.

E. Touch up suction spots after application of first finish coat.

F. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.

G. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.

H. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.

I. Finished work shall be a 'Properly Painted Surface' as defined in this Section.

3.5 FIELD QUALITY CONTROL

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

3.6 CLEANING

A. General:
   1. As work proceeds and upon completion of work of any painting Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition.

B. Waste Management:
   1. Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.
   2. Paint, stain and wood preservative finishes and related materials (thinners, solvents, caulking, empty paint cans, cleaning rags, etc.) shall be disposed of subject to regulations of applicable authorities having jurisdiction.
   3. Remove debris caused by work of paint Sections from premises and properly dispose.
   4. Retain cleaning water and filter out and properly dispose of sediments.

END OF SECTION

ATTACHMENTS

PART 4 - PAINT COLOR SCHEDULE

A. Related Requirements:
   1. Section 09 9112 'Exterior Painted Ferrous Metal'.
   2. Section 09 9113 'Exterior Painted Galvanized Metal'.
   3. Section 09 9124 'Interior Painted Metal'.

B. Category Four Colors. See Section 01 6200 for definitions of Categories:
   1. Interior:
      a. Interior Exposed Electrical Conduit:
         1) Match existing.

   2. Exterior Color Quality Standards:
      a. Exterior Bollards and Canopy Columns/Beams (See Section 09 9112):
         1) Match Drive-Thru canopy column Color ‘C’.
         2) Color 'C':
            a) Blue.
            b) Sher-Cryl High Performance Acrylic Semigloss Clear Tint Base - B66T354 by Sherwin Williams.
            c) Custom Manual Match:

CCE* Colorant	OZ	32	64	128
W1 - White		8	1	
B1 - Black		26		
L1 - Blue	6	20	1	
R3 - Magenta		54		

*Formulas for one gallon of paint

SECTION 09 9112

EXTERIOR PAINTED FERROUS METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Preparing and painting new exterior ungalvanized iron and steel surfaces as described in Contract Documents.

B. Related Requirements:
   1. Section 09 9001: 'Common Painting And Coating Requirements':
      a. 'Attachment: Paint Color Schedule' for Deseret Industries Projects.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:
   1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
      a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved.

B. Description:
   1. New Surfaces: Use MPI(a) EXT 5.1M Waterborne Light Industrial Coating system .

C. Design Criteria:
   1. Systems specified are in addition to prime coats provided under other Sections of Project Manual.
   2. Finish Requirements: Use MPI Premium Grade finish requirements for work of this Section.
   3. Gloss / Sheen Level Required: Gloss Level 5.

D. Materials:
   1. All paints and coatings.
      a. Primer Coat: MPI Product 107, ‘Primer, Rust-Inhibitive, Water Based’.
      b. Finish Coats: MPI Product 163, ‘Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5).

PART 3 - EXECUTION

3.1 APPLICATION

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

B. New Surfaces: Clean metal to be painted of rust, mill scale, grease, oil, and welding spatters, burrs, flux, slag, and fume. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying primer coat.

END OF SECTION

SECTION 09 9113

EXTERIOR PAINTED GALVANIZED METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Preparing and painting new exterior exposed galvanized metal surfaces as Described in Contract Documents.

B. Related Requirements:
   1. Section 09 9001: 'Common Painting And Coating Requirements':
      a. 'Attachment: Paint Color Schedule' for Deseret Industries Projects.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:
   1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories.
      a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.

B. Description:
   1. Exposed Miscellaneous Structural Steel:
      a. New Surfaces: Use MPI(a) EXT 5.3D Pigmented Polyurethane Finish system.
   2. All Other:
      a. New Surfaces: Use MPI(a) EXT 5.3H Latex Finish system.

C. Performance:
   1. Design Criteria:
      a. New Surfaces: MPI Premium Grade finish requirements.
      b. Gloss / Sheen Level Required: Gloss Level 5.

D. Materials:
   1. Polyurethane:
      a. Vinyl Wash Primer Coat: MPI Product 80: ‘Primer, Vinyl Wash’.
      b. Finish Coats:
         1) Epoxy MPI Product 101: ‘Primer, Epoxy, Anti-Corrosive, for Metal’.
         2) Polyurethane MPI Product 72: ‘Polyurethane, Two-Component, Pigmented, Gloss (MPI Gloss Level 6-7)’.
   2. Latex:
      a. Waterborne Primer Coat: MPI Product 134: ‘Primer, Galvanized, Water Based’.
      b. Finish Coats: MPI Product 11: ‘Latex, Exterior Semi-Gloss (MPI Gloss Level 5)’.

PART 3 - EXECUTION

3.1 APPLICATION

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

B. New Surfaces:
   1. Clean 'passivated' or 'stabilized' galvanized steel as specified in SSPC-SP1.
   2. After removal of 'passivated' or 'stabilized' coating or for surfaces without coating, clean surfaces to be painted with mineral spirits or product recommended by Paint Manufacturer. Change to clean rags or wiping cloths regularly to reduce possibility of re-contamination of surface.
   3. Apply prime coat.
   4. Apply finish coats.

END OF SECTION

SECTION 09 9124

INTERIOR PAINTED METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Preparing and painting new interior metal surfaces as described in Contract Documents.

B. Related Requirements:
   1. Section 09 9001: 'Common Painting And Coating Requirements':
      a. 'Attachment: Paint Color Schedule' for Deseret Industries Projects.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:
   1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories.
      a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.

B. Description:
   1. Galvanized Metal:
      a. New Surfaces: Use MPI(a) INT 5.3J Latex Finish system

C. Performance:
   1. Design Requirements:
      a. New Surfaces: MPI Premium Grade finish requirements.
      b. Gloss / Sheen Level Required: Gloss Level 5.

D. Materials:
   1. Primers:
      a. Galvanized Metal: MPI Product 134: ‘Primer, Galvanized, Water Based’.
   2. Finish Coats: MPI Product 153: ‘Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)’.

PART 3 - EXECUTION

3.1 APPLICATION

A. General:
   1. See appropriate paragraphs of Section 09 9001.
   2. Systems specified are in addition to prime coats furnished under other Sections.

B. New Surfaces: Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.

END OF SECTION

SECTION 26 0501

COMMON ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. General electrical system requirements and procedures.
   2. Perform excavating and backfilling work required by work of this Division as described in Contract Documents.
   3. Make electrical connections to equipment provided under other Sections.

B. Products Furnished But Not Installed Under This Section:
   1. Anchor bolts and templates for exterior lighting equipment bases.

C. Related Requirements:
   1. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
   2. Section 31 2316: 'Excavation' for criteria for performance of excavating.
   3. Section 31 2323: 'Fill' for criteria for performance of backfilling.

1.2 REFERENCES

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

1.3 SUBMITTALS

A. Action Submittals:
   1. Product Data:
      a. Provide following information for each item of equipment:
         1) Catalog Sheets.
         2) Assembly details or dimension drawings.
         3) Installation instructions.
         4) Manufacturer's name and catalog number.
         5) Name of local supplier.
         6) Section 26 5600: 'Exterior Lighting' for fixtures, poles, and associated control equipment.
      b. Do not purchase equipment before approval of product data.
   2. Shop Drawings:
      a. Submit on Panelboards:
      b. Indicate precise equipment to be used, including all options specified. Indicate wording and format of nameplates where applicable. Submit in three-ring binder with hard cover.

B. Informational Submittals:
   1. Test And Evaluation Reports:
      a. Report of site tests, before Substantial Completion.
   2. Qualification Statement:
      a. Electrical Subcontractor:
         1) Provide Qualification documentation if requested by Architect or Owner.

b. Installer:
1) Provide Qualification documentation if requested by Architect or Owner.

C. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
a. Operations and Maintenance Data:
1) Provide operating and maintenance instructions for each item of equipment submitted under Product Data.
b. Record Documentation:
1) Manufacturers documentation:
a) Manufacturer's literature.
b) Include copy of approved shop drawings.
c) Provide tritium exit sign tabulations for each exit sign installed on Project including following:
(1) Serial number.
(2) Expiration number.
(3) Installed building location (example – warehouse north rear exit, etc.).

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:
1. NEC and local ordinances and regulations shall govern unless more stringent requirements are specified.
2. Material and equipment provided shall meet standards of NEMA or UL and bear their label wherever standards have been established and label service is available.

B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
1. Electrical Subcontractor:
a. Company specializing in performing work of this section.
1) Minimum five (5) years experience in electrical installations.
2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
b. Upon request, submit documentation.
2. Installer:
a. Licensed for area of Project.
b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
c. Upon request, submit documentation.

PART 2 - PRODUCTS

2.1 SYSTEMS

A. Performance:
1. Design Criteria:
a. Materials provided shall be by new and UL listed.

PART 3 - EXECUTION

3.1 INSTALLERS

A. Acceptable Installers. See Section 01 4301:
1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.2 EXAMINATION

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

3.3 INSTALLATION

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

B. Install Penetration Firestop System appropriate for penetration at electrical system penetrations through walls, ceilings, and top plates of walls.

3.4 FIELD QUALITY CONTROL

A. Field Tests:
   1. Test system operating properly. Notify Architect before test. Rectify defects at no additional cost to Owner.

3.5 CLOSEOUT ACTIVITIES

A. Training:
   1. Provide competent instructor to train Owner's maintenance personnel in operation and maintenance of electrical systems. Factory representatives shall assist this instruction as necessary. Schedule instruction period at time of final inspection.

END OF SECTION

SECTION 26 0533

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Quality of material and installation procedures for raceway, boxes, and fittings used on Project but furnished under other Divisions.
   2. Furnish and install raceway, conduit, and boxes used on Project not specified to be installed under other Divisions.

B. Related Requirements:
   1. See Section 07 8400: 'Firestopping' for raceways penetrating fire rated walls, ceilings, and barriers'.
   2. Section 26 0501: 'Common Electrical Requirements' for general electrical requirements'.

1.2 REFERENCES

A. Reference Standards:
   1. National Fire Protection Association:
      a. NFPA (Fire) 70, 'National Electric Code (NEC)' (2014 Edition or most recent edition adopted by AHJ including all applicable amendments and supplements).
   2. Underwriters Laboratories:
      a. UL 498, 'Attachment Plugs and Receptacles' (15th Edition, 2012).

1.3 SUBMITTALS

A. Action Submittals:
   1. Product Data:
      a. Provide Manufacturer's data sheets and descriptive literature on each product to be used, including:
         1) Preparation instructions and recommendations.
         2) Storage and handling requirements and recommendations.
         3) Installation methods.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer Qualifications:
      a. Firms regularly engaged in manufacturer of raceway and box distribution products and systems of types and sizes required, whose products have been in satisfactory use in similar service for not less than ten (10) years.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:
   1. Manufacturer Contact List:

a. Cooper B-Line, Highland, IL www.b-line.com.
b. Hubbell Incorporated, Milford, CT www.hubbell-wiring.com.
c. Square D, Palatine, IL www.squared.com.
d. Thomas & Betts, Memphis, TN www.tnb.com.
e. Walker Systems Inc, Williamstown, WV (800) 240-2601.
f. Wiremold Co, West Hartford, CT www.wiremold.com.

B. Materials:
1. Raceway And Conduit:
a. Sizes:
1) 1 inch for exterior use, unless indicated otherwise.
2) 1/2 inch for interior use, unless indicated otherwise.
b. Types: Usage of each type is restricted as specified below by product.
1) Galvanized rigid steel or galvanized intermediate metal conduit (IMC) is allowed for use in all areas. Where in contact with earth or concrete, wrap buried galvanized rigid steel and galvanized IMC conduit and fittings completely with vinyl tape.
2) Galvanized Electrical Metallic Tubing (EMT), Flexible Steel Conduit, and Electrical Non-Metallic Tubing (ENT):
a) Allowed for use only in indoor dry locations where it is:
(1) Not subject to damage.
(2) Not in contact with earth.
(3) Not in concrete.
b) For metal conduit systems, flexible steel conduit is required for final connections to indoor mechanical equipment.
3) Schedule 40 Polyvinyl Chloride (PVC) Conduit:
a) Allowed only for exterior underground use unless indicated otherwise on drawings for connection to in-slab equipment or boxes.
4) Pre-wired 3/8 Inch Flexible Fixture Whips: Allowed only for connection to recessed lighting fixtures, lengths not to exceed 72 inches.
c. Prohibited Raceway Materials:
1) Aluminum conduit.
2) Armored cable type AC (BX) cable.
2. Raceway And Conduit Fittings:
a. Rigid Steel Conduit And IMC: Threaded and designed for conduit use.
b. EMT:
1) Compression type.
2) Steel set screw housing type.
c. PVC Conduit:
1) PVC type. Use PVC adapters at all boxes.
2) PVC components, (conduit, fittings, cement) shall be from same Manufacturer.
d. Flexible Steel Conduit: Screw-in type.
e. Liquid-tight Flexible Metal Conduit: Sealtite type.
f. Expansion fittings shall be equal to OZ Type AX sized to raceway and including bonding jumper.
g. Prohibited Fitting Materials:
1) Crimp-on, tap-on, indenter type fittings.
2) Cast set-screw fittings for EMT.
3) Spray (aerosol) PVC cement.
3. Non-Metallic Surface Raceway:
a. Rigid PVC with white finish.
b. Two-piece, base and snap-on cover, and complete with accessories and fittings necessary for complete installation.
c. Type One Acceptable Products:
1) Wiremold 800 Series
2) Equal as approved by Architect before bidding. See Section 01 6200.
4. Cord-Ended Metal Surface Raceway:
a. Grey finish.
b. 40 inches long with 72 inch long cord and grounding type plug.
c. Six receptacles spaced 6 inches on center.
d. Type One Acceptable Products:

1) Wiremold G20-C4
2) Equal as approved by Architect before bidding. See Section 01 6200.

5. Outlet Boxes:
   a. Galvanized steel of proper size and shape are acceptable for all systems. Where metal boxes are used, provide following:
      1) Provide metal supports and other accessories for installation of each box.
      2) Equip ceiling and bracket fixture boxes with fixture studs where required.
      3) Equip outlets in plastered, paneled, and furred finishes with plaster rings and extensions to bring box flush with finish surface.
   b. Non-metallic boxes may be used only for control voltage wiring systems.
   c. Telephone / data outlet boxes shall be single device outlet boxes.
   d. HVAC Instrumentation And Control:
      1) Junction boxes in mechanical equipment areas shall be 4 inches square.
      2) Boxes for remote temperature sensor devices shall be recessed single device.
      3) Boxes for thermostats shall be 4 inches square with raised single device
         a) Receptacles shall be UL tested to meet performance requirements of Fed. Spec. W-C695G General Specification for Electrical Power Connectors and conform to NEMA Specification WD 1-7.01 to 7.10 'Heavy Duty General Use Grounding Receptacles'.
         b) Receptacles shall be UL Listed and be comply with UL 498.
         c) Harness to be single circuit (2 conductor plus ground) with #12 AWG solid type THHN conductors, factory assembled to receptacles.
         d) Provide 6 inch conductor leads for termination to overhead wiring system.
         e) Other compartment shall have modular communications insert bezel installed and three modular communications inserts, as well as labeling.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification Of Conditions:
   1. Confirm dimensions, ratings, and specifications of materials to be installed and coordinate these with site dimensions and with other Sections.
   2. Examine conditions under which raceways and boxes are to be installed. Do not proceed with installation until substrates have been properly prepared and deviations from Manufacturer's recommended tolerances are corrected.
   3. Notify Architect in writing if substrates are not acceptable to install raceways and boxes.
      a. Commencing installation constitutes acceptance of existing conditions.

3.2 PREPARATION

A. Prepare substrates using methods recommended by manufacturer for achieving best result for substrate under project conditions.

3.3 INSTALLATION

A. Interface With Other Work:
   1. Coordinate with existing equipment.

B. Conduit And Raceway:
   1. Conceal conduit and raceways within ceilings and walls, except at Contractor's option, conduit and raceways may be exposed on walls or ceilings of mechanical equipment areas and above acoustical panel suspension ceiling systems. Install exposed raceway runs parallel to or at right angles to building structure lines.
   2. Seal all raceways penetrating fire rated walls, ceilings and barriers. See Section 07 8400.

3. Keep raceway runs 6 inches minimum from hot water pipes.
4. Make no more than four quarter bends, 360 degrees total, in any conduit run between outlet and outlet, fitting and fitting, or outlet and fitting.
    a. Make bends and offsets so conduit is not injured and internal diameter of conduit is not effectively reduced.
    b. Radius of curve shall be at least minimum indicated by NFPA 70.
5. Cut conduit smooth and square with run and ream to remove rough edges. Cap raceway ends during construction. Clean or replace raceway in which water or foreign matter have accumulated.
6. Bend PVC conduit by hot box bender and, for PVC 2 inches in diameter and larger, expanding plugs. Apply PVC adhesive only by brush.
7. Installation In Framing:
    a. Do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width.
    b. Holes shall be one inch diameter maximum.
8. Underground Raceway And Conduit:
    a. Bury underground raceway installed outside building 24 inches deep minimum.
    b. Bury underground conduit in planting areas 24 inches deep minimum. It is permissible to install conduit 6 inch below concrete sidewalks, however, conduit must be buried 24 inches deep at point of exit from planting areas.
    c. Install conduit in/or under concrete slab only at locations shown on drawings.
9. Conduit And Raceway Support:
    a. Securely support raceway with approved straps, clamps, or hangers, spaced as required.
    b. Do not support from mechanical ducts or duct supports without Architect's written approval. Securely mount raceway supports, boxes, and cabinets in an approved manner by:
        1) Expansion shields in concrete or solid masonry.
        2) Toggle bolts on hollow masonry units.
        3) Wood screws on wood.
        4) Metal screws on metal.
10. Prohibited Procedures:
    a. Installation of raceway beneath or embedded in concrete, except where explicitly shown on Contract Documents.
    b. Use of wooden plugs inserted in concrete or masonry units for mounting raceway, supports, boxes, cabinets, or other equipment.
    c. Installation of raceway that has been crushed or deformed.
    d. Use of torches for bending PVC.
    e. Spray applied PVC cement.
    f. Boring holes in truss members.
    g. Notching of structural members.
    h. Supporting raceway from ceiling system support wires.
    i. Nail drive straps or tie wire for supporting raceway.

C. Boxes:
1. Boxes shall be accessible and installed with approved cover.
2. Do not locate device boxes that are on opposite sides of framed walls in the same stud space. In other wall construction, do not install boxes back to back.
3. Locate boxes so pipes, ducts, or other items do not obstruct outlets.
4. Install outlets flush with finished surface and level and plumb.
5. Support switch boxes larger than two-gang with side brackets and steel bar hangers in framed walls.
6. At time of substantial completion, install blank plates on uncovered outlet boxes that are for future use.
7. Location:
    a. Install boxes at door locations on latch side of door, unless explicitly shown otherwise on Contract Drawings. Verify door swings shown on electrical drawings with architectural drawings, and report discrepancies to Architect before rough-in. Distance of box from jamb shall be 6 inches from door jamb.

b. Properly center boxes located in walls with respect to doors, panels, furring, trim and consistent with architectural details. Where two or more outlets occur, space them uniformly and in straight lines with each other, if possible.
c. Center ceramic tile boxes in tile.

3.4 REPAIR

A. Touch-up, repair or replace damaged products before completion of project.

3.5 CLEANING

A. General:
1. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer.

3.6 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION

SECTION 26 5600

EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Install exterior lighting system as described in Contract Documents.

B. Related Requirements:
   1. Section 26 0501: 'Common Electrical Requirements'.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Manufacturers:
   1. Manufacturer Contact List:
      a. Cutler-Hammer Inc, Milwaukee, WI www.cutler-hammer.eaton.com or Cutler-Hammer/Eaton Yale Ltd, Burlington, ON (905) 333-6442.
      b. General Electric Industrial Systems, Charlotte, NC or G E Lighting Canada Inc, Mississauga, ON www.geindustrial.com.
      c. Intermatic Inc, Spring Grove, IL www.intermatic.com.
      d. Paragon Electric Co Inc, Carol Stream, IL www.icca.invensys.com/paragon or Paragon Electric / Maple Chase, Mississauga, ON (800) 951-5526 or (905) 890-5956.
      e. Siemens Energy & Automation, Alphrata, GA www.sea.siemens.com or Siemens Canada, Mississauga, ON (905) 819-8000.
      f. Square D Co, Palatine, IL or Square D / Schneider Electric, Toronto, ON www.squared.com.
      g. Tork Inc, Mount Vernon, NY www.tork.com.

B. Materials:
   1. Exterior Fixtures (provide with canopy):
      a. Finish shall be high quality polyester powder coating:
         1) Finish process shall consist of cleaning, electrostatically applying power coat, and thermal curing.
         2) Weather, scratch, UV, and fade resistant.
      b. Type One Acceptable Products:
         1) As indicated on Fixture Schedule. Do not mix fixtures from different manufacturers for one use.
   2. Exterior Lighting Control (existing):
      a. Time Switch:
         1) Standard 7 day time switch with 16 hour minimum reserve power feature, 277 volts, NEMA 1 enclosure.
         2) Category Four Approved Products. See Section 01 6200 for definitions of Categories.
            a) Intermatic: T7402BC.
            b) Tork: W-222L.
      b. Photo Cell:
         1) 277 volts.
         2) Category Four Approved Products. See Section 01 6200 for definitions of Categories.
            a) Intermatic: K4236.
            b) Paragon: CW201-70.
            c) Tork: 2107.
      c. Lighting Contactor:

PART 3 - EXECUTION

3.1 INSTALLATION

A. Interface With Other Work:
   1. Coordinate with canopy installer location of conduit in concrete bases so the conduit be properly mounted and centered on base.

B. Lighting Control (existing):
   1. Install time switches, manual bypass switches, and contactor inside building. Label each component to identify lighting controlled, I.E. 'PARKING AREA LIGHTING' or 'BUILDING FACADE LIGHTING.' Label with 1/16 inch thick laminated plastic composition material with contrasting color core. Engraved letters shall be 1/4 inch high.
   2. Locate photocell(s) outside building not in direct sunlight.

3.2 CLOSEOUT ACTIVITIES

A. Instruction Of Owner:
   1. Before Substantial Completion, meet with personnel designated by Owner to:
      a. Identify location of control system components.
      b. Explain operation of each component.
      c. Demonstrate adjustment capabilities of time clocks, including turning systems OFF at times other than sunrise and keeping systems OFF on days facility is closed.
      d. Set time clocks as directed.

END OF SECTION

SECTION 31 0501

COMMON EARTHWORK REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited to:
   1. General procedures and requirements for earthwork.

B. Related Requirements:
   1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.

1.2 REFERENCES

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

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference:
   1. Participate in pre-installation conference for common earthwork sections:
      a. Schedule conference before beginning grading work.
      b. Participate in pre-installation conference held jointly with following sections:
         1) Section 03 3111: 'Cast-In-Place Structural Concrete'.
         2) Section 31 1123: 'Aggregate Base'.
         3) Section 31 2316: 'Excavation'.
         4) Section 31 2323: 'Fill'.

5) Section 32 1216: 'Asphalt Paving'.

c. In addition to agenda items specified in Section 01 3100, review following:
1) Review common earthwork schedule.
2) Review protection requirements.
3) Review cleaning requirements.
4) Review safety issues.
5) Review field tests and inspections requirements.

B. Sequencing:
1. General Earthwork:
a. Excavation.
b. Fill.
c. Aggregate Base.

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

A. Protection:
1. Spillage:
a. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways.
b. Remove spillage and sweep, wash, or otherwise clean project, streets, and highways.
2. Dust Control:
a. Take precautions necessary to prevent dust nuisance, both on-site and adjacent to public and private properties.

b. Correct or repair damage caused by dust.

3.3 REPAIR / RESTORATION

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

B. Independently confirm size, location, and number of covers, boxes, and vaults that require adjustment or replacement.

3.4 FIELD QUALITY CONTROL

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

B. Non-Conforming Work:
   1. If specified protection precautions are not taken or corrections and repairs not made promptly, Owner may take such steps as may be deemed necessary and deduct costs of such from monies due to Contractor. Such action or lack of action on Owner's part does not relieve Contractor from responsibility for proper protection of The Work.

END OF SECTION

SECTION 31 1123

AGGREGATE BASE

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install the following as described in Contract Documents:
      a. Aggregate Base:
         1) Miscellaneous exterior concrete.
         2) Asphalt paving.

B. Related Requirements:
   1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
   2. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
   3. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
   4. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
   5. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
   6. Section 01 6200: 'Product Options' for administrative and procedural requirements for product options.
   7. Section 01 7800: 'Closeout Submittals'.
   8. Section 03 3111: 'Cast-In-Place Structural Concrete'.
   9. Section 31 0501: 'Common Earthwork Requirements':
      a. General procedures and requirements for earthwork.
      b. Pre-installation conference held jointly with other common earthwork related sections.
   10. Section 31 2323: 'Fill' for compaction procedures and tolerances.
   11. Section 32 1216: 'Asphalt Paving'.

1.2 REFERENCES

A. Definitions:
   1. Aggregate (Asphalt Paving):
      a. Aggregate: A hard inert mineral material, such as gravel, crushed rock, slag, or sand.
      b. Coarse Aggregate: Aggregate retained on No. 8 (2.36 mm) sieve.
      c. Dense-Graded Aggregate: Aggregate that is graded from maximum size down through filler with object of obtaining an asphalt mix with controlled void content and high stability.
      d. Fine Aggregate: Aggregate passing No. 8 (2.36 mm) sieve.
      e. Reclaimed Asphalt Pavement (RAP): Existing asphalt mixture that has been pulverized, usually by milling, and is used like an aggregate in recycling of asphalt pavements.

B. Reference Standards:
   1. ASTM International:
      a. ASTM C131/C131M-14, 'Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine'.
      b. ASTM D1556/D1556M-15, 'Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method'.
      c. ASTM D1557-12, 'Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))'.
      d. ASTM D1883-16, 'Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils.

e. ASTM D2167-15, ‘Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method’.
f. ASTM D2419-14, ‘Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate’.
g. ASTM D4318-10, ‘Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils'.
h. ASTM D6938-10, 'Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)’.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:
1. Participate in pre-installation conference as specified in Section 31 0501.
2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
a. Review requirements and frequency of testing and inspections.
b. Review aggregate base installation requirements.
c. Review proposed miscellaneous exterior concrete schedule.
d. Review proposed asphalt paving schedule.
e. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
1) Review frequency of testing and inspections.

B. Sequencing:
1. Compaction of structural fill as described in Section 31 2323 'Fill'.
2. Exterior Footings and Foundations are installed.
3. Aggregate Base:
a. Install aggregate base at location shown in Contract Drawings.

C. Scheduling:
1. Miscellaneous exterior concrete:
a. Notify Testing Agency and Architect twenty four (24) hours minimum before placing concrete for exterior site work concrete (sidewalks, curbs, gutters, etc.), footings, foundation walls, and building slabs to allow inspection of aggregate base.
2. Asphalt Paving:
a. Notify Testing Agency and Architect twenty four (24) hours minimum before placing asphalt paving to allow inspection of aggregate base.

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

A. Testing And Inspection:
1. Owner will provide Testing and Inspection for aggregate base:
a. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
b. Owner will employ testing agencies to perform testing and inspection for aggregate base as specified in Field Quality Control in Part 3 of this specification.
1) Owner’s employment of an independent Testing Agency does not relieve Contractor of Contractor’s obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.

2) See Section 01 1200: 'Multiple Contract Summary'.

1.6 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate Base:
1. Exterior Concrete (Section 03 3111 'Cast-In-Place Structural Concrete'):
a. New Aggregate Base:
1) Road Base to conform to State DOT Specifications.
2. Asphalt Paving (Section 32 1216 'Asphalt Paving'):
a. New Aggregate Base:
1) Road Base to conform to 1-1/2 inches (38 mm) minus State DOT Specifications and Gradations.
2) Aggregate base shall be non-plastic.
b. Reclaimed Asphalt and Concrete Pavement (RAP):
1) Pulverized Portland or asphalt concrete paving mixed uniformly with existing aggregate base.
2) Conform to following gradation:
a) Sieve — Percent of Weight Passing

(1)	2 inch	(50.0 mm)	100
(2)	1 1/2 inch	(38.0 mm)	85 - 100
(3)	3/4 inch	(19.0 mm)	60 - 80
(4)	No. 4	(4.750 mm)	30 - 50
(5)	No. 200	(0.075 mm)	5 - 122

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Stockpiles:
1. Provide area for each stockpile of adequate size, reasonably uniform in cross-section, well drained, and cleared of foreign materials.
2. Locate piles so that there is no contamination by foreign material and no intermingling of aggregates from adjacent piles. Do not use steel-tracked equipment on stockpiles.
3. Do not store aggregates from different sources, geological classifications, or of different gradings in stockpiles near each other unless bulkhead is placed between different materials.
4. Do not use washed aggregates sooner than twenty four (24) hours after washing or until surplus water has drained out and material has uniform moisture content.
5. Do not stockpile higher than 15 feet (4.57 m). Cover or otherwise protect stockpiles for use in HMA to prevent buildup of moisture.

B. Surface Preparation (Miscellaneous Exterior Concrete):
   1. Subgrade:
      a. Finish grade to grades required by Contract Documents.
      b. Compact subgrade as specified in Section 31 2323.

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

3.2 INSTALLATION

A. Aggregate Base:
   1. General:
      a. Do not place aggregate base material when subgrade is frozen or unstable.
      b. Spread aggregate base material with equipment except in limited or restricted areas where use of hand spreading is allowed.
      c. Spread aggregate base material in manner that does not break down material and eliminates segregation, ruts, and ridges.
      d. Correct damage to aggregate base caused by construction activities, and maintain corrected aggregate base until subsequent course is placed.
      e. Do not allow traffic on aggregate base.
      f. Remove all standing storm water.
   2. Miscellaneous exterior concrete aggregate base:
      a. Place 4 inches (100 mm) minimum of aggregate base, level, and compact as specified in Section 31 2323.
   3. Asphalt paving aggregate base:
      a. 8 inches (203 mm) thick minimum after compaction in accordance with Contract Drawings.
      b. If roller is smaller than 8 ton (7260 kg), lay aggregate base and compact in two courses.
      c. Compact as specified in Section 31 2323.
      d. Priming: Prime aggregate base with application of 0.2 to 0.5 gallons (2 to 5 liters) of asphalt cement primer per square yard (meter) if pavement will be laid more than three days after compaction of aggregate base, or if precipitation is anticipated between completion of compaction of aggregate base and laying of asphalt paving.
      e. Recompact unprimed aggregate base if it receives precipitation before pavement is laid.
      f. Remove or repair improperly prepared areas as directed by Architect.

B. Tolerances:
   1. Asphalt Paving Areas:
      a. Aggregate base:
         1) 8.00 inches (203.00 mm) high.
         2) Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.
         3) Finished base course shall be true to line and grade within plus or minus 1/4 inch in 10 feet (6 mm in 3 meters).
         4) Maximum variation from required grades shall be 1/10 of one foot (28 mm).

3.3 FIELD QUALITY CONTROL

A. Field Tests And Inspections:
   1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
      a. Quality Control is sole responsibility of Contractor.
         1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:

a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.

2. Aggregate Base:
   a. 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 at curb & gutter replacement area. Three tests at footings.
   b. Asphalt paving area:
      1) Testing Agency shall provide testing and inspection for exterior aggregate base.
      2) Number of tests may vary at discretion of Architect.
      3) Testing Agency will test compaction of base in place according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Tests will be performed at following frequency:
      4) Sitework Areas: One test for every 10,000 sq. ft. (930 sq. m) or less of exterior pads area but no fewer than three tests.

END OF SECTION

SECTION 31 2316

EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Requirements:
   1. Section 31 0501: 'Common Earthwork Requirements' for:
      a. General procedures and requirements for earthwork.
      b. Pre-installation conference held jointly with other common earthwork related sections.
   2. Section 31 1123: 'Aggregate Base'.
   3. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.
   4. Performance of excavating inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

1.2 ADMINISTRATIVE REQUIREMENTS

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

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 PERFORMANCE

A. Excavation:
   1. Building Footings And Foundations:

a. Under Building:
   1) Excavate at least 3 feet and up to 6 feet below existing grade and as necessary for proper placement and forming of footings and foundations so that final grade allows for 18 inches of select fill below footings.
b. Excavation Carried Deeper Than Required:
   1) Under Footings: Fill with concrete specified for footings.

2. Pavement And Miscellaneous Cast-In-Place Concrete:
   a. Excavate as necessary for proper placement and forming of concrete site elements and pavement structure. Remove vegetation and deleterious material and remove from site.
   b. Backfill over-excavated areas with compacted base material specified in Section 31 1123.
   c. Remove and replace exposed material that becomes soft or unstable.
3. Utility Trenches:
   a. Unless otherwise indicated, excavation shall be open cut. Short sections of trench may be tunneled if pipe or duct can be safely and properly installed and backfill can be properly tamped in tunnel sections and if approved by Architect.
   b. Excavate to proper alignment, depth, and grade. Excavate to sufficient width to allow adequate space for proper installation and inspection of utility piping.
   c. If trenches are excavated deeper than required, backfill until trench bottom is proper depth with properly compacted native material.
   d. Pipe 4 Inches (100 mm) In Diameter Or Larger:
      1) Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its length.
      2) Except where rock is encountered, take care not to excavate below depths indicated.
         a) Where rock excavations are required, excavate rock with minimum over-depth of 4 inches (100 mm) below required trench depths.
         b) Backfill over-depths in rock excavation and unauthorized over-depths with loose, granular, moist earth, thoroughly compacted.
      3) Whenever wet or unstable soil incapable of properly supporting pipe, as determined by Architect, occurs in bottom of trench, remove soil to depth required and backfill trench to proper grade with coarse sand, fine gravel, or other suitable material acceptable to Architect.
4. If unusual excavating conditions are encountered, stop work and notify Architect.

3.4 REPAIR / RESTORATION

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

3.5 CLEANING

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

END OF SECTION

SECTION 31 2323

FILL

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Requirements:
   1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
   2. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
   3. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
   4. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
   5. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
   6. Section 01 7800: 'Closeout Submittals'.
   7. Section 31 0501: 'Common Earthwork Requirements' for:
      a. General procedures and requirements for earthwork.
      b. Pre-installation conference held jointly with other common earthwork related sections.
   8. Section 31 1123: 'Aggregate Base' for aggregate base requirements.
   9. Section 31 2316: 'Excavation'.
   10. Division 32: Compaction of subgrade under paving.
   11. Performance of backfilling and compacting inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

1.2 REFERENCES

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

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:
   1. Participate in pre-installation conference as specified in Section 31 0501.

2. In addition to agenda items specified in Section 01 3100 and Section 31 0501, review following:
   a. Review backfill requirements.
   b. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
      1) Review requirements and frequency of testing and inspections.

B. Sequencing:
1. Before backfilling, show utility and service lines being covered on record set of Drawings. Do not backfill until utilities involved have been tested and approved by Architect and until instructed by Architect.

C. Scheduling:
1. Notify Testing Agency and Architect seventy two (72) hours minimum before installation of fill / engineered fill to perform proctor and plasticity index tests on proposed fill or subgrade.
2. Notify Testing Agency and Architect twenty four (24) hours minimum before installation of fill / engineered fill to allow inspection.
3. Allow special inspector to review all subgrades and excavations to determine if site has been prepared in accordance with geotechnical report prior to placing any fill (or concrete).
4. Allow inspection and testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after inspections and test results for previously compacted work comply with requirements.

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Site Material:
1. Do not use existing excavated native material on site as fill and backfill.
2. Excavated material on site that can be identified and confirmed as existing structural fill is suitable for use as fill and backfill to meet Project requirements.

B. Imported Fill / Backfill:
1. Well graded material conforming to ASTM D2487 free from debris, organic material, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.
a. Under Building Footprint And Paved Areas: Fill shall comply with soil classification groups GW, GP, GM, SW, SP, or SM. Fill may not contain stones over 6 inches (150 mm) diameter and ninety five (95) percent minimum of fill shall be smaller than 1-1/2 inch (38 mm) in any direction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before placing fill, aggregate base, or finish work, prepare existing subgrade as follows:
1. Do not place fill or aggregate base over frozen subgrade.
2. Under Building Areas:
a. Scarify subgrade 6 inches (150 mm) deep, moisture condition to uniform moisture content of between optimum and four (4) percent over optimum, and mechanically tamp 6 inches (150 mm) deep to ninety five (95) percent minimum of relative compaction.
3. Under Parking Areas:
a. Scarify subgrade 6 inches (150 mm) deep, moisture condition to uniform moisture content between optimum and four (4) percent over optimum, and mechanically tamp to ninety five (95) percent minimum of relative compaction.
4. Under Miscellaneous Concrete Site Elements:
a. Scarify subgrade 6 inches (150 mm) deep, moisture condition to uniform moisture content between optimum and four (4) percent over optimum, and mechanically tamp to ninety five (95) percent minimum of relative compaction.

3.2 PERFORMANCE

A. Fill / Backfill:
1. General:
a. Around Buildings And Structures: Hand backfill when close to building or where damage to building might result.
b. Do not use puddling or jetting to consolidate fill areas.
2. Compacting:
a. Fill / Backfill And Aggregate Base:
1) All fill material shall be well-graded granular material with maximum size less than 3 inch (76 mm) and with not more than fifteen (15) percent passing No. 200 sieve.
2) Under Building Areas:
a) Place in 8 inch (200 mm) maximum layers, moisture condition to plus or minus two (2) percent of optimum moisture content, and mechanically tamp to ninety five (95) percent minimum of maximum laboratory density as established by ASTM D1557.
3) Under Parking Areas:
a) Place in 8 inch (200 mm) maximum layers, dampen but do not soak, and mechanically tamp to ninety five (95) percent minimum of maximum laboratory density as established by ASTM D1557.
4) Under Miscellaneous Concrete Site Elements:
a) Place in 8 inch (200 mm) maximum layers, dampen but do not soak, and mechanically tamp to ninety five (95) percent minimum of maximum laboratory density as established by ASTM D1557.
5) Utility Trenches:
a) Site:
(1) Place fill in 12 inch (300 mm) layers and moisture condition to plus or minus two (2) percent of optimum moisture content.

(2) Compact fill to ninety five (95) percent minimum relative compaction to within 12 inches (300 mm) of finish grade.
(3) Compact fill above 12 inches (300 mm) to eighty five (85) percent relative compaction.

6) Backfill Under Footings: Not allowed.
7) Other Backfills: Place other fills in 12 inch (300 mm) layers and compact to ninety five (95) percent relative compaction.
8) Loose material from compacted subgrade surface shall be immediately removed before placing compacted fill or aggregate base course.

3.3 REPAIR / RESTORATION

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

3.4 FIELD QUALITY CONTROL

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

2. Fill:
a. Testing Agency shall provide testing and inspection for fill.
b. Number of tests may vary at discretion of Architect.
c. Testing Agency is to provide one (1) moisture-maximum density relationship test for each type of fill material.
d. Prior to placement of engineered fill, inspector shall determine that site has been prepared in accordance with geotechnical report.
e. Footing subgrade: At footing subgrades Certified Inspector is to verify that soils conform to geotechnical report.
f. Testing Agency will test compaction of soils according to ASTM D1556/D1556M, ASTM D2167, and ASTM D6938, as applicable. Lift thicknesses shall comply with geotechnical report. Inspector shall determine that in-place dry density of engineered fill material complies with geotechnical report. Tests will be performed at following locations and frequencies:
1) Paved Areas: At each compacted fill and backfill layer, at least one (1) test for every 10,000 sq. ft. (930 sq. m) or less of paved area but in no case less than three (3) tests.
2) Foundation Wall/Footing Backfill: At each compacted backfill layer, at least one (1) test for each 40 linear feet (12 linear m) or less of wall length, but no fewer than two (2) tests.
3) Trench Backfill: At each 12 inch (305 mm) compacted lift for each 100 linear feet (30.5 linear m) or less of trench length but no fewer than two (2) tests.
4) Curbs, Gutters: Minimum of one (1) test for each lift for each 40 lineal feet (12 linear m) or one (1) test for every 5,000 sq. ft. (465 sq. m) or less of pad area but no fewer than three (3) tests.
g. Required verification and inspection of soils as referenced in 2015 IBC Table 1705.6 'Required Verification And Inspection Of Soils'. Periodic and continuous inspections include:
1) Verify materials below footings are adequate to achieve design bearing capacity (periodic).
2) Verify excavations are extended to proper depth and have reached proper material (periodic).
3) Perform classification and testing of compacted fill materials (periodic).
4) Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill (continuous).

5) Prior to placement of compacted fill, observe subgrade and verify that site has been prepared properly (periodic).

3.5 CLEANING

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

END OF SECTION

SECTION 32 1216

ASPHALT PAVING: Superpave Method

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
1. Furnish and install asphalt concrete paving in parking areas as described in Contract Documents including the following, but not limited to:
   a. Asphalt Mix Design Criteria Summary:

1)	Asphalt Binder:	PG 64-22
2)	Nominal maximum size aggregate (Nmas):	9.5 mm (3/8 inch)
3)	Maximum size aggregate:	12.5 mm (1/2 inch)
4)	Mix Designator (compaction effort); Ndesign:	75
5)	Antistrip Agent:	If required by supplier's mix design (use 1 percent or greater lime slurry when required)
6)	Reclaimed Asphalt Pavement (RAP):	Allowed up to 25 percent. Asphalt binder shall be one grade softer when more than 15 percent RAP is used
7)	ROSP	Not allowed
8)	Warm Mix Additive	If required by supplier's mix design
9)	Recycle Agent:	If required by supplier's mix design

   b. Tack coat: Application of asphaltic material to existing asphalt concrete or portland concrete surfaces before asphalt concrete pavement.
   c. Blotter materials and procedures for absorbing excess asphalt as required.

B. Related Requirements:
1. Section 01 1200: 'Multiple Contract Summary' for multiple contracts.
2. Section 01 3100: 'Project Management and Coordination' for pre-installation conference.
3. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
4. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
5. Section 01 7800: 'Closeout Submittals'.
6. Section 31 0501: 'Common Earthwork Requirements' for:
   a. General procedures and requirements for earthwork.
   b. Pre-installation conference held jointly with other common earthwork related sections.
7. Section 31 1123: 'Aggregate Base' for compaction of aggregate base.
8. Section 31 2323: 'Fill' for compaction procedures and tolerances for base.
9. Section 32 1723: 'Pavement Markings'.

1.2 REFERENCES

A. Association Publications:
1. Asphalt Institute, 2696 Research Park Dr., Lexington, KY www.asphaltinstitute.org:
   a. MS-2, *'Mix Design Methods'* (7th Edition 2015).

B. Definitions:
1. Aggregate: Hard inert mineral material, such as gravel, crushed rock, slag, or sand.
   a. Coarse Aggregate: Aggregate retained on or above No. 4 (4.75 mm) sieve.
   b. Coarse-Graded Aggregate: Aggregate having predominance of coarse sizes.
   c. Dense-Graded Aggregate: Aggregate that is graded from maximum size down through filler with object of obtaining an asphalt mix with controlled void content and high stability.

d. Fine Aggregate: Aggregate passing No. 4 (4.75 mm) sieve.
e. Fine-Graded Aggregate: Aggregate having predominance of fine sizes.
f. Mineral Filler: Fine mineral product at least 70 percent of which passes a No. 200 (75µm) sieve.

2. Air Voids: Total volume of small air pockets between coated aggregate particles in asphalt cement concrete (ACC); expressed as percentage of bulk volume of compacted paving mixture.
3. Anti-Stripping Agent: Chemicals added to bitumen to improve the adhesion of the bitumen to hydrophilic aggregates
4. Asphalt Binder: Asphalt cement or modified asphalt cement that binds aggregate particles into dense mass.
   a. Asphalt Cement used in paving applications that has been classified according to the Standard Specification for Performance Graded Asphalt Binder, AASHTO Designation MP 320. It can be either unmodified or modified Asphalt Cement, as long as it complies with specifications.
5. Asphalt-Aggregate Designator: Alpha-numeric code that indicates nominal maximum size of aggregate, and type and grade of asphalt in aggregate-asphalt mix.
   a. Example: “12.5 PG70-28” means aggregate asphalt mix shall be composed of aggregate gradation with 12.5 mm (1/2 inch) nominal maximum size and performance grade asphalt binder designed to perform between temperatures of 70 deg C and -28 deg C (158 deg F and -18.4 deg F).
6. Equivalent Single Axle Load (ESAL): Effect on pavement performance of any combination of axle loads of varying magnitude equated to number of 18,000-lb. (80-kN) single-axle loads that are required to produce an equivalent effect.
7. Maximum Size (Superpave): One sieve larger than the nominal maximum size.
8. Ndesign (Superpave): Design number of gyrations used for design of Hot Mix Asphalt (HMA).
9. Nominal Maximum Size: One sieve size larger than first sieve size retaining more than 10 percent of Sample. Nominal maximum size sieve will retain minimum of 0 and maximum of 10 percent of sample. Maximum size is one sieve size larger than nominal maximum size.
10. Performance Graded Asphalt Binder (PGAB): Asphalt binder designed to produce HMA that meets certain performance standards. Designations for performance-graded asphalt binders are prefixed with PG. Each grade designation also includes two sets of numbers that denote temperature range. This is a range of climate temperatures to which road may be exposed and still be expected to give superior performance. PG numbers do not indicate viscosity as in conventional liquid asphalt designations.
11. Pre-emergent Herbicide: Chemical that is applied before weeds emerge. It acts by killing weed seedlings and /or establishing layer of chemical on or near soil surface that is toxic to germinating seeds and young seedlings.
12. Reclaimed Asphalt Pavement (RAP): Existing asphalt mixture that has been pulverized, usually by milling, and is used like aggregate in recycling of asphalt pavements.
13. 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.
14. Tack Coat: Very light application of liquid asphalt, or asphalt emulsion diluted with water.

C. Reference Standards:
1. American Association of State and Highway Transportation Officials:
   a. AASHTO T 304-11: ‘Standard Method of Test for Uncompacted Void Content of Fine Aggregate’.
   b. AASHTO T 322-07(2011), ‘Standard Method of Test for Determining the Creep Compliance and Strength of Hot-Mix Asphalt (HMA) Using the Indirect Tensile Test Device.
2. ASTM International:
   a. ASTM C29/C29M-16, ‘Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate'.
   b. ASTM C88-13, ‘Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate'.
   c. ASTM C117-13, ‘Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing'.

d. ASTM C131/C131M-14, 'Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine'.
e. ASTM C142/C142M-10, 'Standard Test Method for Clay Lumps and Friable Particles in Aggregates'.
f. ASTM D242/D242M-09(2014), 'Standard Specification for Mineral Filler For Bituminous Paving Mixtures'.
g. ASTM D977-13, 'Standard Specification for Emulsified Asphalt'.
h. ASTM D979/D979M-15, 'Practice for Sampling Bituminous Paving Mixtures'.
i. ASTM D2041/D2041M-11, 'Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures'.
j. ASTM D2172/D2172M-11, 'Standard Test Methods for Quantitative Extraction of Bitumen From Bituminous Paving Mixtures'.
k. ASTM D2256/ D2256M-10, 'Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method'.
l. ASTM D2397/D2397M, 'Standard Specification for Cationic-Emulsified Asphalt'.
m. ASTM D2419-14, 'Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate'.
n. ASTM D2950/D2950M-14, 'Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods'.
o. ASTM D3203/D3203M-11, 'Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures'.
p. ASTM D3549/D3549M-11, 'Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens'.
q. ASTM D3665-12, 'Standard Practice for Random Sampling of Construction Materials'.
r. ASTM D4318-10, 'Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils'.
s. ASTM D4552/D4552M-10, 'Standard Practice for Classifying Hot-Mix Recycling Agents'.
t. ASTM D4759-11, 'Standard Practice for Determining the Specification Conformance of Geosynthetics'.
u. ASTM D4791-10, 'Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
v. ASTM D5444-15, 'Standard Method for Mechanical Size Analysis of Extracted Aggregate'.
w. ASTM D5821-13, 'Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate'.
x. ASTM D6307-10, 'Standard Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method'.
y. ASTM D6932/D6932M-08(2013), 'Standard Guide for Materials and Construction of Open-Graded Friction Course Plant Mixtures'.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:
1. Participate in pre-installation conference as specified in Section 31 0501 'Common Earthwork Requirements':
2. In addition to agenda items specified in Section 01 3100 'Project Management and Coordination' and Section 31 0501 'Common Earthwork Requirements', review following:
a. Review surveying and staking of parking areas and installation of sleeves.
b. Review proposed aggregate base schedule.
c. Review rough grading elevations before placing paving fill.
d. Review fine grading elevations of subgrade fine grading operations before placing aggregate base and paving.
e. Review proposed asphalt paving schedule.
f. Review asphalt paving mix design.
g. Review pre-emergent herbicide protection of adjoining property and planting area on site requirements, schedule and application requirements.
h. Review schedule of mandatory asphalt paving surface treatment to be applied after placement of asphalt paving.
i. Review schedule of paint stripes to be applied after asphalt paving surface treatment.
j. Review safety issues.

k. Review Section 01 4523 'Testing and Inspecting Services' for administrative requirements and responsibilities and Field Quality Control tests and inspections required of this section.
   1) Review requirements and frequency of testing and inspections.

B. Scheduling:Notify Testing Agency and Architect twenty four (24) hours minimum before placing asphalt paving.

1.4 SUBMITTALS

A. Action Submittals:
   1. Product Data:
      a. Pre-Emergent Herbicide:
         1) Manufacturer's published product data on pre-emergent herbicide.

B. Informational Submittals:
   1. Certificates:
      a. Require mix plant to furnish delivery/load tickets for each batch of asphalt. Keep delivery tickets at job-site for use of Owner's Representative. Tickets shall show following:
         1) Name of mix plant.
         2) Date.
         3) Name of contractor.
         4) Name and location of Project.
         5) Serial number of ticket.
         6) Asphalt mix type.
         7) Time loaded.
         8) Identity of truck.
      b. Installer to provide Manufacturer's Certificate of Compliance stating material authenticity and properties for review and acceptance by Architect before product use.
   2. Design Data:
      a. Hot Mix Asphalt:
         1) Design Criteria:
            a) Develop mix design according to current Asphalt Institute MS-2 'Asphalt Mix Design Methods' for Superpave Method.
            b) Submittal format:
               (1) Design mix submittal shall follow format as indicated in current Asphalt Institute MS-2*, 'Mix Design Methods.*
         2) Mix design of asphalt paving must meet Design Criteria minimum requirements and show conformance to the following:
            a) Location and name of hot mix asphalt concrete production facility.
            b) Date of mix design. If older than two (2) years, recertify mix design.
            c) Asphalt mix type.
            d) Mix design method used.
            e) Mix density.
            f) Design air voids (three and one half (3.5) percent.
            g) Asphalt content in percent.
            h) Performance grade of asphalt binder.
            i) Nominal maximum size of aggregate.
            j) Maximum size of aggregate.
            k) Aggregate source and gradation.
            l) Mix properties and design parameters.
            m) Temperature of mix at plant and in the field for optimum field compaction.
            n) Amount of recycled asphalt pavement (RAP).
            o) Mineral fillers, antistrip, and recycle agent percentages.
            p) Identify if warm mix technologies will be used and how much warm mix additive will be used.

            Within thirty (30) days prior to asphalt construction, submit actual design mix to Architect, Civil Engineering Consultant of Record and Independent Testing Laboratory for review and approval.
   3. Test And Evaluation Reports:

a. Hot Mix Asphalt:
1) Copies of test results from tests conducted to assure compliance to Contract Document requirements.

4. Manufacturer Instructions:
a. Pre-Emergent Herbicide:
1) Application instructions for pre-emergent herbicide.

5. Qualification Statement:
a. Installer:
1) Provide Qualification documentation if requested by Owner's Representative.

C. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800 'Closeout Submittals':
a. Record Documentation:
1) Manufacturer's documentation:
a) Pre-emergent herbicide documentation.
b) Asphalt paving design.
c) Test reports.
d) Certificates from mix plant of delivery/load tickets.
e) Manufacturer's Certificate of Compliance.
2) Testing and Inspection Reports:
a) Testing Agency Testing and Inspecting Reports of asphalt paving.

1.5 QUALITY ASSURANCE

A. Qualifications. Requirements of Section 01 4301 'Quality Assurance - Qualifications' applies but not limited to following:
1. Asphalt Paving:
a. Foreman of asphalt paving crew has completed at least three (3) projects of similar size and nature.
b. Upon request, submit documentation.
2. Pre-emergent herbicide:
a. Applicator:
1) Pre-emergent herbicide shall be applied by applicator certified by State in which Project is located as an applicator of agricultural chemicals.

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

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:
1. Asphalt Material:
a. Each shipment must:
1) Be uniform in appearance and consistency.
2) Show no foaming when heated to specified loading temperature.
b. Do not supply shipments contaminated with other asphalt types or grades than those specified:
1) Do not use petroleum distillate as a release agent.
2. Pre-emergent herbicide:

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

B. Storage And Handling Requirements:
1. Pre-emergent herbicide:
a. Do not freeze. Store in at temperatures above 41 deg F (5 deg C).
b. Follow Manufacturer's storage and handling requirements.

1.7 FIELD CONDITIONS

A. Ambient Conditions:
1. Pre-emergent herbicide:
a. Follow printed Manufacturers instruction for environmental hazards:
b. Follow printed Manufacturers instruction ambient conditions for application of product.
2. Tack Coat:
a. Apply only when air and roadbed temperatures in shade are greater than 40 deg F (4.4 deg C). Temperature restrictions may be waived only upon written authorization from Architect or Civil Engineer.
b. Do not apply to wet surfaces.
c. Do not apply when weather conditions prevent tack coat from adhering properly.
3. Asphalt paving:
a. Do not perform work during following conditions:
1) Ambient temperature is below 45 deg F (7.2 deg C) or will fall below 45 deg F (7.2 deg C) during placement.
2) Temperature of aggregate base below 50 deg F (10 deg C).
3) Cold Weather Asphalt Paving Plan: If asphalt pavement is placed outside of these temperature limits or those identified in MINIMUM Temperature Degrees, a plan is required which includes:
a) Haul times.
b) Placement details.
c) Compaction aids used in production.
d) Owner does not assume responsibility for asphalt when placed outside temperature limits.
4) Presence of free surface water or weather is unsuitable.
5) Wind or ground cools mix material before compaction.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. General:
1. Follow current Asphalt Institute MS-2 'Asphalt Mix Design Methods' for Superpave Method.

B. Asphalt Mix:
1. Asphalt Binder:
a. Performance Graded Asphalt Binder:
1) Use performance graded asphalt binder identified under Asphalt Mix Design Criteria.
2. Aggregates:
a. Use clean, hard, durable, angular, sound, consisting of crushed stone, crushed gravel, slag, sand, or combination.
b. Use nominal maximum size aggregate and maximum size aggregate per Asphalt Mix Design Criteria. Aggregate gradation to meet **Table 1** - **MASTER GRADING BANDS** requirements:

Table 1 - MASTER GRADING BANDS			
Sieve (mm)		Nominal Maximum Aggregate Size	
		12.5 mm	9.5 mm
Control Sieves	19	100	-
	12.5	100	100
	9.5	< 90	90 – 100
	4.75	--	< 90
	2.36	28 – 58	32 – 60
	0.075	2 – 10	2 – 10
Restricted Zone	2.36	39.1	47.2
	1.18	25.6 – 31.6	31.6 – 37.6
	0.6	19.1 – 23.1	23.5 – 27.5
	0.3	15.5	18.7

NOTES:
1. It is assumed fine and coarse aggregate have same bulk specific gravity.
2. Gradation is expressed in percent passing by weight, ASTM C136. Percentage of fines passing 0.075 mm control sieve determined by washing, ASTM C117.

c. Provide aggregate material properties to meet **Table 2 – AGGREGATE PHYSICAL PROPERTIES** requirements:

Table 2 –AGGREGATE PHYSICAL PROPERTIES

Property		ASTM	ESAL	Min	Max
Coarse Aggregate (does not pass No. 4 sieve)					
Angularity (fractured faces), percent		D5821	less than 0.3	55	--
			0.3 to 3.0	75	--
			greater than 3.0	85/80	--
Wear (hardness or toughness), percent		C131/C131M	less than 0.3	--	40
			0.3 to 3.0	--	35
			greater than 3.0	--	35
Flats or elongates (3:1 length to width), percent, maximum		D4791	--	--	20
Fine Aggregate (passing No. 4 sieve)					
Angularity (uncompacted void content), percent (AASHTO T304)		--	less than 0.3	--	--
			0.3 to 3.0	40	--
			greater than 3.0	45	--
Sand equivalent, percent		D2419	less than 0.3	40	--
			0.3 to 3.0	40	--
			greater than 3.0	45	--
Friable particles, percent		C142	--	--	2
Plastic limit, maximum	Liquid limit	D4318	--	--	25
	Plastic limit	D4318	--	--	6

Notes:
1. ESAL in millions.
2. Angularity by weight retained above 9 mm sieve, with at least one fractured face. 85/80 denotes 85 percent coarse aggregate has one fractured face and 80 percent has two or more fractured faces.
3. Wear of aggregate retained above 2.36 mm sieve unless specific aggregates have higher values are known to be satisfactory.
4. Flats or elongates retained above 4.75 mm sieve.
5. Friable particles passing No. 4.75 mm sieve.
6. Plasticity, passing No. 4.75 sieve. Aggregate is no-plastic even when filler material is added to aggregate.

Blended Physical Properties				
Dry-rodded unit weight, lb/ft^3, minimum	C29/C29M	-	75	--
Weight loss (soundness), percent, maximum	C88		--	16
Clay content or cleanliness (sand equivalent), percent	D2419	less than 0.3	45	--
		more than 0.3	60	--

Notes:
1. Weight loss using sodium sulfate.
2. Sand equivalent value is after going through dryer or before drum mixer. The sand equivalent requirement is waived for RAP aggregate but applies to remainder of aggregate blend.
3. Friable particles of clay lumps, shale, wood, mica, and coal passing 4.75 sieve.

3. Admixture:
   a. Antistrip: Heat stable, cement slurry, lime slurry, dry lime, or liquid antistrip:
      1) Add if mix is moisture sensitive as determined by 'Moisture Susceptibility' paragraph below.
   b. Mineral Filler: Comply with requirements of ASTM D242/D242M.
   c. Recycle Agent: Comply with requirements of ASTM D4552/D4552M.

2.2 MATERIAL

A. Aggregate Base: Conform to applicable requirements as specified in Section 31 1123: 'Aggregate Base'.

B. Pre-Emergent Herbicide:
   1. Design Criteria:
      a. Selective type pre-emergence control chemical containing forty (40) percent Trifluralin minimum for control of annual grasses and broadleaf weeds.
      b. Non-oil based sterilant.
      c. Labeled for under-pavement use.
   2. Type Two Acceptable Products:
      a. Treflan E.C. by Monterey AgResources, Fresno, CA www.montereyagresources.com (available in western United States).
      b. Trust 4EC by WinField Solutions LLC (Agrilsolutions), St Paul, MN www.agrisolutionsinfo.com (available in United States).
      c. Equal as approved by Architect before installation. See Section 01 6200.

C. Reclaimed Asphalt Pavement (RAP). Aggregate: Restrictions include:
   1. Allowed up to 25 percent. Asphalt binder shall be one grade softer when more than 15 percent RAP is used.

D. Tack Coat:
   1. Emulsified asphalt meeting requirements of ASTM D977, Grade SS-1H, CQS-1H, or ASTM D2397/D2397M, Grade CSS-1H.

PART 3 - EXECUTION

3.1 INSTALLERS

A. Approved Applicators. See Section 01 4301 'Quality Assurance - Qualifications':

3.2 PREPARATION

A. General:
   1. Aggregate base and paving must be placed before any moisture or seasonal changes occur to subgrade that would cause compaction tests previously performed to be erroneous. Re-compact and retest subgrade soils that have been left exposed to weather.

B. Protection Of In-Place Conditions:
   1. Pre-emergent herbicide:
      a. Take necessary precautions to protect adjoining property and areas designated for planting on building site.
      b. Do not contaminate any body of water by direct application, cleaning of equipment or disposal of wastes.
   2. Asphalt Paving:
      a. Protect all structures, including curb, gutter, sidewalks, guard rails and guide posts.
      b. Protect neighborhood, storm drains and down-stream fish habitat.

C. Surface Preparation:
   1. Survey and stake parking surfaces to show grading required by Contract Documents.
   2. Subgrade (soil below aggregate base):
      a. Prepare natural soil subgrade as specified in Section 31 2213 'Rough Grading' or prepare fill subgrade as described in Section 31 2216 'Fine Grading'.
   3. Aggregate base:
      a. Finish grade parking surface area to grades required by Contract Documents.
      b. Compact aggregate base as specified in Section 31 1123 'Aggregate Base'.

c. Tolerances:
1) Elevation of aggregate base shall be 0.00 inches (0.00 mm) high and no more than 1/2 inch (12.7 mm) low.
2) Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.

4. Tack coat:
a. Clean surface of all materials such as mud, dirt, leaves, etc. that prevent tack from bonding to existing surfaces.
1) If flushed, allow surface to dry.

5. Asphalt paving:
a. Area shall be clean and tack coat applied before placing of asphalt paving.
1) Remove all moisture, dirt, sand, leaves, and other objectionable material from prepared surface before placing asphalt.
2) Locate, reference, and protect all utility covers, monuments, curb, and gutter and other components affected by asphalt paving operations.
3) Allow sufficient cure time for tack coat before placing asphalt.

3.3 APPLICATION

A. Interface With Other Work:
1. Section 31 1123: 'Aggregate Base' for compaction of aggregate base.
2. Section 31 2323: 'Fill' for compaction procedures and tolerances.

B. Pre-Emergent Herbicide:
1. Asphalt paving areas:
a. Follow Manufacturer's printed application requirements:
b. Apply to prepared subgrade dispersed in liquid. Concentrate shall be such that Manufacturer's full recommended amount of chemical will be applied to every 1000 sq ft (93 sq m) and liquid will penetrate minimum of 2 inches (50 mm).
c. Application shall be no more than one (1) day before installation of aggregate base.

C. Tack Coat:
1. General:
a. Tack coat vertical surfaces or existing asphalt cement concrete or portland cement concrete that will be in contact with asphalt paving.
b. Use tack coat diluted to a 2:1 (concentrate water) ratio.
c. Use pressure distributor to apply in uniform, continuous spread.
d. Cover all tacked surface areas with surfacing materials same day of application.
2. Application rate. Typically as follows:
a. Emulsions, 0.08 to 0.15 gallons per sq yd (0.303 to 0.679 L per sq m) of diluted material:
1) Apply sufficient to achieve ninety five (95) percent or better coverage of existing surfaces.
2) Above application rates may vary according to field conditions. Obtain approval from Civil Engineer for quantities, rate of application, temperatures, and areas to be treated before any application.

D. Asphalt Paving:
1. General:
a. Paving adjacent to cast-in-place concrete site elements shall be between 1/4 inch (6 mm) higher than concrete.
b. Surface texture of hand worked areas shall match texture of machine-laid areas.
c. Surface shall be uniform with no 'birdbaths'. Leave finished surfaces clean and smooth. Variations from specified grades shall not exceed 1/2 inch (12.7 mm).
d. Cross Slope: 1/4 inch (6 mm) in 10 feet (3.0 m) perpendicular to centerline except at cross section grade breaks.
e. Grade: 1/8 inch (3 mm) in 10 feet (3.0 m) parallel to centerline.
f. Do not place on frozen aggregate base or during adverse climatic conditions such as precipitation or when roadway surface is icy or wet.
g. Uniformly mix materials so aggregate is thoroughly coated with asphalt.

h. Place at temperatures established by the mix design with self-propelled laydown machine.
i. Use **Table 3 – MINIMUM TEMPERATURE, DEGREES** as guide:

Table 3 – MINIMUM TEMPERATURE, DEGREES

Ambient Air Temperature Deg F.	Ambient Air Temperature Deg C.	Compacted Paving Mat Thickness					
		3/4" (19 mm)	1" (25 mm)	1 1/2" (38 mm)	2" (50 mm)	3" (75 mm)	4" + (100 mm) +
45 – 50	7 – 10	---	---	---	---	280	265
50 – 59	10 – 15	---	---	---	280	270	255
60 – 69	16 – 20	---	---	285	275	265	250
70 – 79	21 – 79	285	285	280	270	265	250
80 - 89	27 - 31	280	275	270	265	260	250
90+	32+	275	270	265	260	250	250

j. Longitudinal bituminous joints shall be vertical and properly tack coated if cold. Transverse joints shall always be tack coated.

2. Compaction:
   a. Compact asphalt paving to ninety four (94) percent plus or minus two (2) percent of theoretical maximum specific gravity, ASTM D2041/D2041M (Rice Method - maximum theoretical density).
   b. Roll with powered equipment capable of obtaining specified density while providing required smoothness.
   c. Begin breakdown rolling immediately after asphalt is placed when asphalt temperature is at maximum.
   d. Complete handwork compaction concurrently with breakdown rolling.
   e. Execute compaction so visibility of joints is minimized:
   f. Complete finish rolling to improve asphalt surface as soon as possible after intermediate rolling and while asphalt paving is still warm.
   g. Do not use vibration for finish rolling.
3. Lift Thickness:
   a. Preferred Method:
      1) For pavements 3-1/2 inch (89 mm) or thinner apply asphalt paving in single lift.
      2) For pavements greater than 3-1/2 inch (89 mm), use alternate method below.
   b. Alternate Method:
      1) Asphalt paving may be applied in two (2) lifts, first 2 inches (50 mm) thick minimum and second 1 1/2 inches (38 mm) thick minimum following temperature recommendations of following paragraph.
      2) Surface of first lift shall be clean and provide tack coat between first and second lifts.
      3) Provide not less than two (2) times maximum aggregate size in compacted asphalt concrete mixes.

3.4 FIELD QUALITY CONTROL

A. Field Tests And Inspections:
   1. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services':
      a. Quality Control is sole responsibility of Contractor:
         1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
            a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
         2) Contractor bears full responsible for compliance with all contract requirements and quality control on project and will be responsible for quality of asphalt mixture and asphalt installation.

B. Field Tests (Provided by Contractor):
1. General:
   a. Contractor bears full responsibility for compliance with all contract requirements and quality control on project and will be responsible for quality of asphalt mixture and asphalt installation.
   b. Testing and Inspection Reports to be distributed as specified in Section 01 4523 'Testing And Inspection Services'.
2. Compaction Tests:
   a. Contractor to provide compaction tests of asphalt being placed to establish rolling patterns and installation procedures.
   b. Compaction tests by Contractor are independent of compaction tests being provided by Owner. See Section 01 4523 'Testing And Inspection Services'.
   c. Asphalt paving shall be compacted to ninety four (94) percent of Theoretical Maximum Specific Gravity (Rice) plus three (3) percent or minus two (2) percent. Determine percent compaction by ASTM D2041/D2041M.
3. Thickness Tests:
   a. Determine thickness of paving being placed, no less than one (1) test per 10,000 sq. ft. (930 sq. m) of paving or portion thereof, three (3) tests minimum.

C. Field Tests And Inspections (Provided by Owner):
1. General:
   a. Compaction tests provided by Owner will be used to validate or determine discrepancies with testing by Contractor.
   b. Civil engineer applies pay factor for Gradation/Asphalt Content, In-Place Density. Civil engineer computes pay factor for each lot.
   c. Opening paved surface to traffic does not constitute acceptance.
   d. Asphalt-aggregate mix sampling as per ASTM D979/D979M.
      1) Test for:
         a) Air voids as per ASTM D3203/D3203M.
         b) Asphalt binder content as per ASTM D6307.
         c) Aggregate gradation as per ASTM D5444.
   e. Lot size: 10,000 sq. ft. (930 sq. m) or part thereof.
   f. Sub lot size: 5,000 sq. ft. (465 sq. m) or part thereof.
2. At Site Testing and Inspection:
   a. General:
      1) Sampling: One (1) random sample per sample per 10,000 sq. ft. (930 sq. m): Locations as follows:
         a) Behind paver before compaction.
            or
         b) Where sub-lot exhibits non-uniform appearance.
   b. Asphalt Paving:
      1) Testing Agency shall provide full time nuclear density testing and inspection for asphalt paving during asphalt paving operations (nuclear density testing is informational testing only and does not constitute acceptance by Owner).
      2) Inspection to include:
         a) Aggregate coating.
         b) Compaction control and effort required.
         c) Suitability of spreading and asphalt paving equipment.
         d) Temperature of mix as delivered and placed.
            (1) Reject mixes exceeding 325 deg F (163 deg C) in transport vehicle as required in Non-Conforming Work below.
            (2) Dispose of cold mix in paver hopper as thin spread underlay.
      3) Field Tests:
         a) When tested with 10 foot (3 meter) straight edge, surface of completed work shall not contain irregularities in excess of 1/4 inch (6 mm).
         b) Determine percent compaction per ASTM D2950/D2950M unless other nondestructive nonnuclear methods such as sonar are used.
         c) Provide written nuclear density testing, or other nondestructive nonnuclear methods such as sonar, of asphalt paving at minimum rate of one (1) per 2,500 sq.

ft. (232 sq. m). Select test locations by ASTM D3665 and sample per ASTM D979/D979M before compaction. Minimum of three (3) tests required.

d) Compact asphalt paving to ninety four (94) percent of Theoretical Maximum Specific Gravity (Rice) plus three (3) percent or minus two (2) percent.

e) Maximum average total air voids in completed hot mix asphalt shall be eight (8) percent but more than three (3) percent as determined by ASTM D2041/D2041M.

f) Determine thickness of paving being placed, no less than one (1) test per 10,000 sq. ft. (930 sq. m) of paving or portion thereof, three (3) tests minimum.

3. At Laboratory Testing:

a. General:

1) Provide at least one (1) laboratory test series for every 10,000 sq. ft. (930 sq. m) or part thereof (minimum of one (1) test):

a) Test reports will show compliance with Contract Documents regarding type and depth of aggregate base, depth and density of asphalt paving, asphalt content, aggregate gradation, flow and stability, bulk specific gravity and maximum specific gravity.

b) Reports will also give test procedures used by testing laboratory.

b. Compaction and Final Density:

1) Pavement thickness and final density to be determined by results of coring. Provide one (1) core per 10,000 sq. ft. (930 sq. m) or part thereof. Minimum of three (3) tests required if under 30,000 sq. ft. (2 787 sq. m).

a) Based upon core samples, compaction is acceptable if test deviations are within pay factor 1.00 limits.

b) At Project Manager's discretion, after consulting with Design Team, a Lot with a sub-lot test deviation greater than Reject may stay in place at fifty (50) percent cost.

c) Select test locations by ASTM D3665 and sample per ASTM D979/D979M after compaction.

c. Compaction Pay Factor:

1) Based upon core samples, compaction is acceptable if test deviations are within pay factor 1.00 limits.

2) At Project Manager's discretion, after consulting with design team, a Lot with a sub-lot test deviation greater than Reject may stay in place at fifty (50) percent cost.

3) Average Density, in percent as shown in **Table 4 – COMPACTION PAY FACTORS**:

Table 4 – COMPACTION PAY FACTORS
(94 percent of theoretical maximum specific gravity – Superpave (Rice)
(ASTM D2041/D2041M plus three (3) or minus two (2) percent)

Pay Factor	Density, in Percent	
	Average	Lowest Test
0.70	More than 96	---
1.00	92 to 96	89 or Greater
0.90	92 to 96	Less than 89
Reject	Less than 92	---

Notes:

1. At Contractor's discretion and expense, do Hamburg wheel track test (AASHTO T 304) on 3 additional random core samples from non-complying sub-lot of 5,000 sq. ft. (465 sq. m). Sub-lot will be accepted if average rut depth is less than 10 mm at 20,000 passes.

d. Pavement Thickness:

1) Pavement thickness and final density to be determined by results of coring. Provide one (1) core per 10,000 sq. ft. (930 sq. m) or part thereof. Minimum of three (3) tests required if under 30,000 sq. ft. (2 787 sq. m).

a) Acceptance will be based on the average of all thickness tests.

b) At Project Manager's discretion, after consulting with design team, payment may be made for areas deficient in thickness by more than 0.75 inches (19.05 mm) at fifty (50) percent. If not, remove and replace at no additional cost to the Owner as shown in **Table 5 – THICKNESS PAY FACTORS**:

Table 5 – THICKNESS PAY FACTORS	
Pay Factors	Thickness Deficiency, in Inches (ASTM D3549/D3549M)
1.00	0.00 to 0.25
0.90	0.26 to 0.50
0.70	0.51 to 0.75
Reject	0.76 to 1.00

e. Air Voids:
1) Basis of evaluation is laboratory compacted samples (not field compacted samples).
2) Air voids will be mix design target plus or minus one (1) percent.
3) If test results are not within this Section's limits, options include correction of production procedures or alternate mix design acceptable to Civil Engineer.

D. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
1. Asphalt Paving:
a. Deficient asphalt paving thickness:
1) Place additional material over deficient areas. Do not skin patch. Mill for inlay if necessary. Correct deficient asphalt paving thickness at no additional cost to the Owner.
b. Rejection and Removal of Asphalt Paving:
1) Remove asphalt paving found defective after installation and install acceptable product at no additional cost to the Owner.
c. Removal of Asphalt Paving:
1) Remove spatter, over-coat, or mar at no additional cost to the Owner.
2) Remove asphalt from borrow pits or gutters at no additional cost to the Owner.
d. Repair of Asphalt Paving:
1) Repair or replace defective joints, seams, edges at no additional cost to the Owner.

3.5 PROTECTION

A. Tack Coat:
1. Protect all surfaces exposed to public view from being spattered or marred. Remove any spattering, over-coating, or marring at no additional cost to Owner.
2. Traffic:
a. Do not permit traffic to travel over tacked surface until tack coat has cured and dried.

B. Asphalt Paving:
1. Protect hot mixed asphalt (HMA) pavement from traffic until mixture has cooled enough not to become marked.

3.6 CLEANING

A. Waste Management:
1. Pre-emergent herbicide:
a. Follow Manufacturer's recommendations for disposal of product at approved waste disposal facility.
1) Do not reuse empty containers.

END OF SECTION

SECTION 32 1723

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 REFERENCES

A. Reference Standards:
   1. Federal Specifications and Standards:
      a. FED-STD-595C, 'Federal Standard: Colors Used in Government Procurement' (16 Jan 2008).
      b. FED TT-P-1952F, 'Paint, Traffic and Airfield Marking, Waterborne' (17 Feb 2015).
   2. U.S. Department of Transportation Federal Highway Administration:
      a. FHWA MUTCD-10, 'Manual on Uniform Traffic Control Devices'.

1.3 SUBMITTALLS

A. Action Submittal:
   1. Product Data:
      1) Manufacturer's published product data and certification that product supplied meets requirements of this specification.

B. Informational Submittal:
   1. Test And Evaluation Reports:
      a. Acrylic Paint:
         1) Provide reports showing compliance to FED TT-P-1952F.

C. Closeout Submittals:
   1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
      a. Record Documentation:
         1) Manufacturer's Documentation:
            a) Product data.
            b) Specification compliance documentation.
         2) Test and Evaluation Reports:
            a) Reports showing compliance.

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:
   1. Paint must meet requirements of FED TT-P-1952-F and local regulations for VOC.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:
   1. Materials shall be delivered in original, unopened containers with labels intact.
      a. Labels to include:

1) Manufacturer's name and address.
2) TT-P-1952F reference.
3) Classification Type.
4) Color.

B. Storage And Handling Requirements:
1. Follow Manufacturer's storage and handling requirements.
2. Protect stored material from freezing at temperatures above 35 deg F (2 deg C) or above 115 deg F (46.1 deg C).
3. Do not invert or roll containers.

1.6 FIELD CONDITIONS

A. Ambient Conditions:
1. Acrylic Paint:
a. Apply only on dry clean surfaces, during favorable weather (not excessively windy, dusty, or foggy), and when damage by rain, fog, or condensation not anticipated.
b. Paving surface and Ambient temperature shall be minimum 50 deg F (10 deg C) and rising.
c. Temperature shall not drop below 50 deg F (10 deg C) within twenty four (24) hour period following application.
d. Acetone based paints that are one hundred (100) percent acrylic shall not drop below 32 deg F (0 deg C) within twenty four (24) hour period following application.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Acrylic Paint:
1. Description:
a. Low VOC, ready-mixed, one- component, acrylic waterborne traffic marking paint suitable for application on concrete, asphalt, sealers, and previously painted areas of these surfaces.
2. Design Criteria:
a. General:
1) Traffic Paint.
2) Non-volatile portion of vehicle for all classification types shall be composed of one hundred (100) percent acrylic.
3) Meet FED TT-P-1952F specification requirements.
4) Fast drying when applied at ambient conditions requirement.
5) Low VOC.
6) Non-Reflectorized.
7) Traffic paints not intended for use as floor paints. Do not use on pedestrian walkways or large surfaces such as ramps, floors and stairs which may become slippery when wet.
b. Classification:
1) Type III for increased durability.
c. Composition:
1) Non-volatile portion for all types shall be composed of one hundred (100) percent acrylic polymer as determined by infrared spectral analysis.
2) Prohibited material:
a) Product does not contain mercury, lead, hexavalent chromium, toluene, chlorinated solvents, hydrolysable chlorine derivatives, ethylene-based glycol ethers and their acetates, nor any carcinogen.
d. Qualitative Requirements:
1) Meet FED TT-P-1952F requirements for:
a) Abrasion resistance.
b) Accelerated package stability.

c) Accelerated weathering.
d) Appearance.
e) Color requirements:
(1) Yellow color match.
f) Condition in container.
g) Flexibility.
h) Freeze/thaw stability.
i) Heat-shear stability.
j) Scrub resistance.
k) Skinning.
l) Titanium dioxide content.
m) Water resistance.

e. Quantitative requirements:
1) Meet FED TT-P-1952F requirements (Table 1).
2) Acetone based paints that are one hundred (100) percent acrylic and have exempt status under Federal law are exempt from meeting FED TT-P-1925F requirements.

3. Colors:
a. General:
1) Traffic Paint will be furnished in any Federal Standard 595 color in accordance to FED-STD-595C:
a) Yellow: 33538.
b. Yellow:
1) Lane lines, edge lines, transverse lines, arrows, words, symbol markings, speed bump markings, parking space markings.
2) Cross-hatching in medians, cross hatching in safety zones separating opposing traffic flows, crosswalk stripes, safety markings, centerlines, edge lines along left edge of one-way roadway or one way ramp.

4. Type Two Acceptable Products:
a. Any product meeting design criteria of this specification as approved by Architect/Owner's Representative before application. See Section 01 6200.

PART 3 - EXECUTION

3.1 PREPARATION

A. Acrylic Paint:
1. Asphalt Surfaces:
a. Do not apply paint until asphalt has cooled.
2. Concrete Surfaces:
a. Do not apply paint to new concrete surfaces until concrete has cured seven (7) days minimum.

B. Surfaces shall be dry and free of grease and loose dirt particles.

C. Perform layout with chalk or lumber crayon only.

3.2 APPLICATION

A. General:
1. Mix in accordance and apply as per Manufacturer's instructions.
2. Apply at locations and to dimensions and spacing as shown on Contract Drawings.

B. Tolerances:
1. General: Make lines parallel, evenly spaced, and with sharply defined edges.
2. Line Widths:
a. Match existing.

b. Plus or minus 1/4 inch (6 mm) variance on straight segments.
c. Plus or minus 1/2 inch (13 mm) variance on curved alignments.

C. Coverage:
1. Paint stripes added to new asphalt and concrete surfaces:
a. Apply single coat.
2. Apply traffic paint at rate of 13 to 15 mils minimum wet thickness, 8 to 9 mils dry thickness. Application at more than 15 mils may result in extended dry times and may cause lifting or cracking on some asphalt surfaces.

3.3 FIELD QUALITY CONTROL

A. Non-Conforming Work:
1. Replace or correct defective material not conforming to requirements of this specification or any work performed that is of inferior quality at no cost to Owner.

3.4 CLEANING

A. General:
1. Remove drips, overspray, improper markings, and paint material tracked by traffic by sand blasting, wire brushing, or other method approved by Architect/Owner's Representative before performance.

B. Waste Management:
1. Remove debris resulting from work of this Section. Dispose of or recycle all trash and excess material in manner conforming to current EPA regulations and local laws.

END OF SECTION