City of Plymouth

Central Parking Structure Restoration 2022
Plymouth, Michigan

Project Manual
Project No. 220597

BIDDING AND CONSTRUCTION

fishbeck
Engineers | Architects | Scientists | Constructors

PROJECT MANUAL
FOR
CITY OF PLYMOUTH

CENTRAL PARKING STRUCTURE RESTORATION 2022
PLYMOUTH, MICHIGAN

July 22, 2022
Project Number 220597

ENGINEER

FISHBECK
4775 Campus Drive
Kalamazoo, Michigan 49008
269.375.3824

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SECTION 00 11 16 - INVITATION TO BID

City of Plymouth

Central Parking Structure Restoration 2022

1. RECEIPT OF BIDS

City of Plymouth, the Owner, will receive sealed Bids for the Central Parking Structure Restoration 2022 project in the Plymouth City Clerk's Office at Plymouth City Hall, 201 Main Street, Plymouth, Michigan 48170, until Thursday, August 25, 2022, 10 a.m., local time. No Bids will be received after that time. Bids will be publicly opened and read aloud at that time and place.

2. SCOPE OF PROJECT

The Project consists of a single general contract for restoration work on the Central Parking Structure as indicated and/or specified in the Contract Documents.

3. ISSUING OFFICE

Bidding Documents are being issued by Fishbeck's Kalamazoo office. Bidders should direct questions and correspondence to the Fishbeck Project Manager.

Justin Thomson, Project Manager
Fishbeck
4775 Campus Drive, Kalamazoo, Michigan 49008
e-mail: jthomson@fishbeck.com

4. OBTAIN BIDDING DOCUMENTS

Bidding Documents will be released by Fishbeck via e-mail to prospective Bidders. Drawings can be requested by sending an email to jthomson@fishbeck.com. Addenda, corrections, or other revisions that may be issued will be released via e-mail.

5. BID SECURITY

Bid security in the amount, form and subject to the conditions provided in the Instructions to Bidders must be submitted with each Bid.

6. WITHDRAWAL OF BIDS

Bids may not be withdrawn for a period of 45 days after the actual date of opening thereof. This time period may be extended by mutual agreement of the Owner and any Bidder or Bidders.

7. RIGHT TO REJECT BIDS

The Owner reserves the right to waive any irregularities and to reject any and all Bids. The Owner also reserves the right to delete any item or portion of the work.

8. PREBID CONFERENCE

A pre-bid conference will be held on Tuesday, August 9, 2022, 10 a.m., local time at the City of Plymouth Downtown Development Authority, 831 Penniman Avenue, Plymouth, Michigan 48170. Representatives of Owner and Engineer will be present to discuss the Project. Prospective Bidders are required to attend and participate in the conference.

END OF SECTION 00 11 16

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SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

The Instructions to Bidders, AIA Document A701, 1997 edition is part of these Bidding Documents and is incorporated herein as fully as if here set forth.

END OF SECTION 00 21 13

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SECTION 00 22 13 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

The following supplements or modifies the Instructions to Bidders, AIA Document A701, 1997 edition. Where a portion of the Instructions to Bidders is modified or deleted by these Supplementary Instructions to Bidders, the unaltered portions of the Instructions to Bidders shall remain in effect.

ARTICLE 1 DEFINITIONS

1.1 Revise the last sentence to read as follows:

The proposed Contract Documents consist of those documents enumerated in the Agreement.

ARTICLE 2 BIDDER'S REPRESENTATIONS

2.1 Add new Subparagraphs 2.1.5 and 2.1.6 as follows:

2.1.5 the Bidder is a properly licensed Contractor according to the laws and regulations of Michigan and meets qualifications indicated in the Bidding and Contract Documents.

2.1.6 the Bidder has incorporated into the Bid adequate sums for work performed by installers whose qualifications meet those indicated in the Bidding and Contract Documents.

2.1.3 Add new Subparagraph 2.1.3.1 and 2.1.3.2 as follows:

2.1.3.1 The Bidder has investigated all required fees, permits, and regulatory requirements of authorities having jurisdiction and has properly included in the submitted bid the cost of such fees, permits, and requirements not otherwise indicated as provided by Owner.

2.1.3.2 It is the responsibility of each Bidder prior to submitting a Bid to notify the Engineer of all conflicts, errors, or discrepancies in the Bidding Documents.

ARTICLE 3 BIDDING DOCUMENTS

3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

3.2.2.1 Add the following new Subparagraph immediately after Subparagraph 3.2.2.:

3.2.2.1 Submit Bidder's Requests for Interpretation via email.

3.2.4 Add the following new Subparagraph immediately after Subparagraph 3.2.3.:

3.2.4 In these Bidding Documents, references made to the Instructions to Bidders and to the Agreement includes by inference all amendments or supplements made in the Supplementary Instructions to Bidders and the Agreement Supplement, respectively.

3.3 SUBSTITUTIONS

3.3.1 Delete Subparagraphs 3.3.1, 3.3.2, and 3.3.3 and replace with the following:

3.3.1 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or equal" items.

3.3.2 Whenever materials or equipment are specified or described in the Bidding Documents by using the name of one or more suppliers, the Bid shall be based on providing the materials or equipment of one of the suppliers named.

3.3.3 Whenever it is specified or described in the Bidding Documents that a substitute or "or equal" item of material or equipment may be furnished or used by the Contractor if acceptable to the Engineer, application for such acceptance will not be considered by the Engineer until after the date of the Owner's signature on the Agreement Supplement. The procedure for submission of any such application by the Contractor and consideration by the Engineer is set forth in Division 01 - General Requirements.

ARTICLE 4 BIDDING PROCEDURES

4.1 PREPARATION OF BIDS

4.1 Add new Subparagraphs 4.1.8 through 4.1.12 as follows:

4.1.8 The Bid shall include unit prices when called for by the Bidding Documents. Owner may elect to consider unit prices in the determination of award. Unit prices will be incorporated into the Contract.

4.1.9 Owner may elect to disqualify a bid due to failure to submit a bid in the form requested, failure to bid requested alternates or unit prices, failure to complete entries in all blanks in the Bid Form, or inclusion by the Bidder of any alternates, conditions, limitations, or provisions not called for.

4.1.10 Bid price shall include sales and use taxes and federal excise taxes on materials and equipment to be incorporated in the work.

4.1.11 The submission of a Bid will constitute an incontrovertible representation by the Bidder that the Bidder has complied with the requirements of the Contract Documents, and that the Bid, without exception, is premised upon performing and furnishing the work required by the Contract Documents in such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the construction documents; and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the work.

4.1.12 Bidder shall adequately determine the location and sizes (thicknesses, etc.) of all existing structural features (slabs, walls, toppings, waterproofing membranes, etc.) in order to obtain all necessary information for an informed Bid. Contractor requests for additional compensation for variations of existing structure quantities will not be considered.

4.2 BID SECURITY

4.2.4 Add a new Subparagraph 4.2.4 as follows:

4.2.4 Bid security made payable to the Owner shall be in an amount of at least 5 % of the Bidder’s base Bid price, and shall be in the form of an original certified or bank check or a Bid bond on AIA Document A310, issued by a surety authorized to transact business in Michigan and named in the current list of “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury (Circular 570 as amended). Facsimile, telegraphic or other electronically transmitted Bid bonds submitted with the Bid will be considered provided that, within 48 hours after the time for receipt of Bids, the Bid bond form with the original signature, seal and original required attachments are received by the Owner.

ARTICLE 6 POST-BID INFORMATION

6.1 CONTRACTOR’S QUALIFICATION STATEMENT

6.1 Add the following at the end of Paragraph 6.1:

The Bidder with whom the Owner will execute a Contract will be required to demonstrate previous experience in constructing at least 5 projects of a similar type, comparable size and comparable complexity within the past 5 years. Include this data with the submission of AIA Document A305.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

7.1 BOND REQUIREMENTS

7.1.1 Revise Subparagraph 7.1.1 to read as follows:

7.1.1 The Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds shall be issued by a surety meeting the requirements of Subparagraph 11.6.1 of the Supplementary Conditions.

7.1.3 Delete Subparagraph 7.1.3.

7.2 TIME OF DELIVERY AND FORM OF BONDS
7.2.1 Delete Subparagraph 7.2.1 and replace with the following:

7.2.1 When the Bidder delivers the executed Contract Documents to the Engineer on behalf of the Owner, it shall be accompanied by the required bonds.

7.2.3 Revise Subparagraph 7.2.3 to read as follows:

7.2.3 The bonds shall be executed and be in force on the date of the execution of the Contract.

7.3 Add the following new Paragraph:

7.3 CONTRACT INSURANCE
7.3.1 The General and Supplementary Conditions set forth the Owner's requirements as to insurance.

7.3.2 When the Bidder delivers the Executed Contract Documents to the Engineer on behalf of the Owner, it shall be accompanied by the required certificates of insurance (and other evidence of insurance requested by the Owner).

ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR
8.1.1 Delete the paragraph under Article 8 and replace with the following:

8.1.1 The Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor, where the basis of payment is a Stipulated Sum, as supplemented by the Agreement Supplement contained herein.

8.1.2 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement bound into the Project Manual with the other Contract Documents which are identified in the Agreement as attached thereto. Within 10 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within 10 days thereafter, Owner will deliver one fully signed counterpart to Successful Bidder.

END OF SECTION 00 22 13

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SECTION 00 41 13 – BID FORMS

Bid of _____ hereinafter called the Bidder, organized and existing under the laws of or a resident of the State of _____, doing business as _____.*

*Insert as applicable: "a corporation", "a partnership" or "an individual".

To City of Plymouth, hereinafter called the Owner.

ARTICLE 1 PROPOSAL TO ENTER INTO AN AGREEMENT

1.1 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with the Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 ACCEPTANCE OF TERMS; BID SUBJECT TO ACCEPTANCE

2.1 The Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. The Bid will remain subject to acceptance for 45 days after the Bid opening, or for such longer period of time that the Bidder may agree to in writing upon request by the Owner.

ARTICLE 3 BIDDER'S REPRESENTATIONS

3.1 In submitting this Bid, the Bidder represents that:

3.1.1 The Bidder has read and understands the Bidding Documents to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being concurrently or presently under construction, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged:

Addendum Number	Addendum Date
_____	_____
_____	_____
_____	_____
_____	_____

3.1.2 The Bidder has visited the site and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, and performance of the Work.

3.1.3 The Bidder is familiar with and is satisfied as to all federal, state, and local laws and regulations that may affect cost, progress, and performance of the Work.

3.1.4 The Bidder has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site which have been identified in the Supplementary Conditions.

3.1.5 The Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface and subsurface) at or contiguous to the site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by the Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by the Bidder, and safety precautions and programs incident thereto.

3.1.6 The Bidder does not consider that any further examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance of the Work at the prices bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

3.1.7 The Bidder is aware of the general nature of work to be performed by the Owner and others at the site that relates to the Work as indicated in the Bidding Documents.

3.1.8 The Bidder has correlated the information known to the Bidder, information and observations obtained from visits to the site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies and data with the Bidding Documents.

3.1.9 The Bidder has given the Engineer written notice of all conflicts, errors, ambiguities or discrepancies that the Bidder has discovered in the Bidding Documents, and the written resolution thereof by the Architect is acceptable to the Bidder.

3.1.10 The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

3.1.11 The Bid is made in compliance with the Bidding Documents.

3.1.12 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception.

3.2 The Bidder further represents that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; the Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; the Bidder has not solicited or induced any individual or entity to refrain from bidding; and the Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over the Owner.

ARTICLE 4 BID PRICE

4.1 The Bidder will complete the Work in accordance with the Contract Documents for the following price:

4.1.1 Base Bid _____ ($_____)
(use words) (figures)

4.1.2 If the required quantities of the items listed below are increased or decreased by Change Order, the adjustment unit price set forth below shall apply for each such increased or decreased quantity. The adjustment prices shall include all material and equipment costs, labor, other installation costs, and the Bidder's overhead and profit. The adjustment price below shall be the same figure for quantity increase or quantity decrease:

Work Item Description	Reference Detail	Units	Unit Cost
Division 03 - Concrete			
Ceiling Repair	5/SR501	Square Feet	$
Column Repair	7/SR501	Square Feet	$
Wall Repair	8/SR501	Square Feet	$
Division 07 - Thermal and Moisture Protection			
Remove and Replace Cove Joint Sealant	3/SR511	Lineal Feet	$
Division 22 - Plumbing			
Remove and Replace Floor Drain	8/SR511	Each	$

_____
Bidder (Firm or Corporation Name)

ARTICLE 5 CONTRACT TIMES

5.1 The Bidder agrees that the Work will be completed on or before the following dates:

5.1.1 Anticipated Award Date: September 6, 2022 (Subject to Owner Approval).

5.1.2 Earliest mobilization date is September 14, 2022.

5.1.3 Completion date of concrete and waterproofing work is October 28, 2022.

5.1.4 Substantial completion date of Project is December 2, 2022.

5.2 The Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified above.

ARTICLE 6 ATTACHED DOCUMENTS

6.1 The following documents are attached to and made a condition of this Bid:

6.1.1 Required Bid security.

6.1.2 List of Proposed Subcontractors.

6.1.3 List of Proposed Suppliers.

6.1.4 List of Project References.

SUBMITTED on _____, 20__ BY: _____

Date* Name of Bidder*

_____ _____

Street* Signature

_____ _____

City, State, and Zip* Name and Title of Signatory*

_____

Telephone Number*

_____

Facsimile Number*

*Typed or printed in ink.

END OF SECTION 00 41 13

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SECTION 00 52 00 – AGREEMENT

The Standard Form of Agreement Between Owner and Contractor, AIA Document A101, 2007 edition will be used for executing the Contract between the Owner and the Contractor.

END OF SECTION 00 52 00

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SECTION 00 72 00 – GENERAL CONDITIONS

The General Conditions of the Contract for Construction, AIA Document A201, 2007 edition is part of this Contract and is incorporated herein as fully as if here set forth.

END OF SECTION 00 72 00

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SECTION 00 73 00 – SUPPLEMENTARY CONDITIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The following supplements shall modify, change, delete from or add to and shall take precedence over the AIA Document A201-2007, General Conditions of the Contract for Construction. Where any portion of the General Conditions of the Contract for Construction is modified or any Paragraph, Subparagraph, or Clause thereof is modified or deleted by these supplements, the unaltered provisions of that Article, Paragraph, Subparagraph, or Clause shall remain in effect.

B. Article 1 - General Provisions

1. Add the following Subparagraphs to Paragraph 1.1:

1.1.9 Original design drawings are available from the Owner upon request.

2. Add the following Subparagraph and Clauses to Paragraph 1.1:

1.1.10 Miscellaneous Definitions:

1.1.10.1. "Provide" means to furnish, fabricate, complete, deliver, install and erect, including all labor, materials, equipment, apparatus, appurtenances, and expenses necessary to complete in place, ready for operation and use.

1.1.10.2. "As shown," "as detailed," "as indicated" or words of similar import mean as shown, as detailed, or as indicated in the Documents.

1.1.10.3. "As selected," "as approved," "as accepted" or words of similar import mean as selected by, as approved by, or as accepted by the Engineer.

1.1.10.4. "Shall" means mandatory.

1.1.10.5. "As required" means as prescribed by the Contract Documents.

1.1.10.6. "As necessary" means essential to the completion of the Work.

3. Add the following Subparagraphs to Paragraph 1.2:

1.2.4 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

1. The Agreement between the Owner and Contractor.
2. Addenda, with those of later date having precedence over those of earlier date.
3. The Supplementary Conditions.
4. The General Conditions of the Contract for Construction.
5. Drawings and Specifications.

In case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided. Large scale Drawings take precedence over smaller scaled Drawings, figured dimensions over scale measurements, and noted materials over graphic representation.

1.2.5 The Specifications are separated into various Sections and Divisions in general accordance with the format established by the Construction Specifications Institute. No responsibility is assumed by the Owner nor the Engineer for omissions or duplications by the Contractor in the completion of the Contract due to any alleged error in the arrangement of the material in the Specifications nor shall any such segregation of portions of the Work operate to make the Engineer an arbiter in defining limits to the agreements between the Contractor and his Subcontractors or suppliers.

1.2.6 Work lists, if any, in the Specification Sections have been included as optional aids to the Contractor and not as limits or mandatory distributions of the work of the various trades involved in the Project. Because of the nature of the construction process, work may be found to be described in one Section and listed in another. All work indicated or described in the Specifications is required regardless of its distribution. When items are stated as "included," the words "but not limited to" shall be assumed as implied. The final correlation of work lists is the responsibility of the Contractor.

1.2.7 The Specifications are of the abbreviated type and may include incomplete sentences. Omissions or phrases such as "The Contractor shall" or "complying with the requirements of" are intentional. Omitted words or phrases shall be supplied by inference in the same manner as they are when a "note" occurs on the Drawings. Words in the singular shall include the plural wherever applicable, or the context so indicates.

C. Article 2 - Owner

Delete Subparagraph 2.2.5 and substitute the following:

2.2.5 The Contractor will be furnished with an electronic file of the Drawings and Project Manuals.

D. Article 3 - Contractor

Add the following Subparagraphs 3.4.4 and 3.4.5 to 3.4:

3.4.4 After the Contract has been executed, the Owner and the Engineer will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications).

3.4.5 By making requests for substitutions based on Subparagraph 3.4.4 above, the Contractor:

3.4.5.1 represents that the Contractor has investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;

3.4.5.2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;

3.4.5.3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Engineer's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

3.4.5.4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

Add the following Subparagraph 3.6.1 to 3.6:

3.6.1 and such taxes are included in the Contract Sum.

Add the following Subparagraphs 3.14.3 to 3.14:

3.14.3 The Engineer shall be advised and approve of any concrete cutting or patching. Patching materials are specified in Section 03 3000, Cast-In-Place Concrete or Section 03 0130, Concrete Repair.

Add the following Subparagraph 3.15.3 to 3.15:

3.15.3 Concrete surfaces in areas exposed to public view shall be cleaned free of grease and oil spills; paint and tire marks; grout and mortar spalls; leaching, paint and rust stains; nails; and chalk, ink and paint marks. Glass and metal surfaces shall be cleaned. The work shall be done prior to final completion of the project.

Add the following Subparagraph 3.18.1.1 to 3.18.1:

3.18.1.1 The foregoing Subparagraph shall, but not by way of limitation, specifically include all claims and judgments which may be made against the Owner, Engineer, Engineer's consultants, and agents and employees of any of them under the governing laws of the state or governmental body having jurisdiction; and further, against claims and judgments arising from violations of public ordinances and requirements of governing authorities due to the Contractor's or Subcontractor's method of execution of the work.

Substitute the following Paragraph 3.18.2 for 3.18.2:

3.18.2 The indemnification which the Contractor and Subcontractors are to provide under Paragraph 3.18 shall include, extend, and insure to and be for the benefit of the Owner, Engineer, Engineer's consultants, their respective agents, and employees of any of them, and shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under Worker's Compensation or Employer's liability acts, disability benefit acts, employee benefit acts or other legislation or rule of law, whether legislative, judicial, administrative or common law.

E. Article 4 - Administration of the Contract

Add the following Subparagraph 4.1.4 to 4.1.

4.1.4 The word "Architect" or "Engineer" where used in the Contract Documents shall mean: Fishbeck

Add the following Clauses 4.2.7.1 through 4.2.7.6 to Subparagraph 4.2.7.

4.2.7.1 The submission to the Engineer of submittals and samples approved by the Contractor and the review of said submittals and samples by the Engineer shall not constitute submission in writing or approval in writing of any deviation from the requirements of the Contract Documents unless it is brought to the attention of the Engineer that specific changes are being suggested.

4.2.7.2 Changes to the Drawings and Specifications by means of submittals become the responsibility of the party initiating such changes.

4.2.7.3 The submission to the Engineer of submittals and samples approved by the Contractor and the review of said submittals and samples by the Engineer shall not imply that any of the requirements of the Contract Documents have been waived or superseded.

4.2.7.4 No delay or omission to exercise any right or remedy accruing to the Engineer upon any breach or event of default of the Contractor shall impair any such right or remedy or be construed to be a waiver of any such breach or default; not be deemed a waiver of any other prior or subsequent breach or default. Any waiver, permit, consent, or approval on the part of the Engineer of any breach or default, or of any provision or condition hereof, must be in writing and shall be effective only to the extent that such writing specifically sets forth.

4.2.7.5 The Engineer's stamp on a submittal shall not relieve the Contractor from responsibility for errors or omissions in the submittal and shall not imply that the Contractor may proceed in error.

4.2.7.6 Submittals and samples shall be submitted in accordance with the procedure of Section 01 33 00, Submittal Procedures.

Change the last sentence of Subparagraph 4.2.10 to the following:

The Project Representative's duties, responsibilities and limitations of authority are as set forth in AIA Document B352, Duties, Responsibilities and Limitations of Authority of the Project Representative

F. Article 7 - Changes in the Work

Add the following Clauses 7.2.2, 7.2.3, and 7.2.4 to 7.2.

7.2.2 Work performed by General Contractor - maximum 8% overhead and 7% profit or 15% for overhead and profit.

7.2.3 On Work performed by Subcontractor, the General Contractor will be allowed a maximum 7% handling charge.

7.2.4 Work performed by Subcontractor - maximum 8% overhead and 7% profit or 15% for overhead and profit.

G. Article 9 - Payments and Completion

Add the following Clauses 9.3.1.3 to 9.3.1.

9.3.1.3 The Owner shall retain 10 percent of the amount due the Contractor on account of progress payments.

Add the following Subparagraph 9.3.4 to 9.3.

9.3.4 Affidavits and Waivers of Lien Requirements.

9.3.4.1 Concurrent with the submittal of each partial payment requisition, for all work completed, the Contractor shall furnish Affidavit and Waivers of Lien evidencing that all wages for labor and all invoices for material and services

9.3.4.2 Payment for this work shall be paid for by the Owner to the Contractor on the basis that the Contractor shall make prompt and immediate payment to the respective Subcontractors and suppliers upon delivery by each of them of the proper waivers and affidavits to the Contractor. Such waivers and affidavits shall be included by the Contractor with the next request for partial payment

9.3.4.3 Furnishing of Affidavits and Waivers of Lien, in forms as approved and when required by Owner shall be a precedent and requirement to the issuance of all Certificates of Payment by the Engineer

9.3.4.4 Within fifteen days after issuance of Certificate of Substantial Completion, and prior to issuance of Certificate of Final Completion, Contractor, Subcontractor and Suppliers shall furnish appropriate Waivers of Lien and Affidavits evidencing that all wages for labor and all invoices for materials and services for the entire Project have been paid in full. Failure to provide such waivers and affidavits shall be grounds for withholding final payment

Add the following Paragraph 9.11 to Article 9:

9.11 Liquidated Damages

9.11.1 The Contractor and the Contractor's surety, if any, shall be liable for and shall pay the Owner the sums hereinafter stipulated as liquidated damages for each calendar day of delay until the Work is substantially complete, i.e., a maximum One Thousand Dollars ($1,000) per day.

H. Article 11 - Insurance and Bonds

Add the following sentence to 11.1.2:

11.1.2 Notwithstanding the above, the insurance required by paragraph 11.1 shall be on an occurrence basis

Add the following Clause 11.1.2.1 to 11.1.2.

11.1.2.1 Such insurance shall be written to include the following coverages and for not less than the following minimum limits or greater if required by law:

Workers' Compensation

[X]	State	Statutory
[X]	Applicable Federal (e.g., Longshoreman, harbor work, Work at or outside U.S. Boundaries):	Statutory
[X]	Employer's Liability:	$500,000 each accident $500,000 Disease, Policy limit $500,000 Disease, Ea. Employee

General Liability (including Premises-Operations; Independent Contractors' Protective; Products and Completed Operations; Broad Form Property Damage):

(a) Special Requirements:

1. The Owner, Engineer, their consultants, agents, and employees shall be named as "additional insureds" on the commercial general liability policy of the general contractor and/or subcontractor of any tier.

(b) Bodily Injury:

$2,000,000 Each Occurrence
$4,000,000 Aggregate

(c) Property Damage:

$2,000,000 Each Occurrence
$4,000,000 Aggregate

(d) Products and Completed Operation Insurance Shall be maintained for a minimum period of 2 year(s) after final payment and the Contractor shall continue to provide evidence of such coverage to the Owner on an annual basis during the aforementioned period.

(e) Property Damage Liability Insurance shall include coverage for the following hazards:

[X] X (Explosion)
[X] C (Collapse)
[X] U (Underground)

(f) Contractual Liability (Hold Harmless Coverage):
Bodily Injury:
$2,000,000 Each Occurrence
$4,000,000 Aggregate
Property Damage:
$2,000,000 Each Occurrence
$4,000,000 Aggregate

(g) Personal Injury:
$2,000,000 Each Occurrence
$4,000,000 Aggregate

(h) If the General Liability policy includes a General Aggregate, such General Aggregate shall be not less than $4,000,000. Policy shall be endorsed to have General Aggregate apply to this Project only:
[X] Yes [ ] No
Umbrella Excess Liability
$1,000,000 Over primary insurance
$1,000,000 Retention

(i) Automobile Liability (owned, non-owned, hired):
1. Special Requirements:
   a. All owned, hired, and non-owned vehicles including the loading or unloading thereof.
   b. The Owner, Engineer, their consultants, agents, and employees shall be named as "additional insureds" on the commercial automobile liability policy of the general contractor and/or subcontractor of any tier.

Bodily Injury:
$2,000,000 Each Person
$4,000,000 Each Accident
Property Damage:
$2,000,000 Each Occurrence

Substitute the following paragraph 11.1.3 for 11.1.3.

11.1.3 Certificates of Insurance for the above coverages and the Owner's Protective Policy shall be submitted to the Engineer for transmittal to the Owner for his approval prior to the start of construction. The Contractor shall certify to the Owner that he has obtained or will obtain similar certificates of insurance from each of his Subcontractors before their work commences. Each Subcontractor must be covered by insurance of the same character and in the same amounts as the Contractor unless the Contractor and Owner agree that a reduced coverage is adequate. Each Subcontractor's insurance shall cover the Owner, Engineer, their agents, and employees. The Contractor shall submit a statement with each affidavit stating that he has obtained certificates of insurance, or other satisfactory evidence, that all required insurance is in force for each of the Subcontractors listed on his affidavit. If the "additional insureds" have other insurance which is applicable to the loss, it shall be on an excess or contingent basis. The amount of the company's liability under this policy shall not be reduced by the existence of such other insurance. Contractor's certificates shall be in duplicate on standard Acord forms.

Add the following Clauses 11.1.3.1 through 11.1.3.5 to 11.1.3.

11.1.3.1 Certificate of insurance shall contain a statement therein or a rider attached thereto incorporating the indemnity clause stated in Paragraph 3.18 (Indemnification) and Subparagraphs 3.18.1, 3.18.1.1 and 3.18.2 of the General Conditions, and including the changes and additions made in those subparagraphs within these supplemental General Conditions.

11.1.3.2 These Certificates and the insurance policies required by this Paragraph 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least thirty (30) days' prior written notice has been given to the Owner and Engineer. If any of the foregoing insurance coverages are required to remain in force after final payment and are reasonably available, an additional certificate evidencing continuation of such coverage shall be submitted with the final Application for Payment as required by Subparagraph 9.10.2. Information concerning reduction of coverage shall be furnished by the Contractor with reasonable promptness in accordance with the Contractor's information and belief.

11.1.3.3 The obligations of the Contractor under the provisions of this article shall not extend to the liability of the Engineer, his agents, or employees arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs, or specifications, or (2) the giving of or the failure to give directions or instructions by the Engineer, his agents, or his employees to the extent that such giving or failure to give is the cause of the injury or damage.

11.1.3.4 The Contractor agrees to limit the liability of the Engineer and the Owner for negligence, errors, and omissions of the Engineer to 3.5 percent of the construction contract amount or a sum of $50,000, whichever is greater.

11.1.3.5 The Certificate of Liability Insurance shall be from an Insurance Company that has a rating of A- or better as listed by A.M. Best Company.

Add the following paragraph to 11.3.1.1

11.3.1.1 Property Insurance provided by Owners shall not cover any tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring, and other similar items commonly referred to as construction equipment which may be on the site and the capital value of which is not included in the work. The Contractor shall make his own arrangements for any insurance he may require on such construction equipment.

Add the following sentence to 11.3.1.3

11.3.1.3 The property insurance for the Work requires a minimum deductible of: $10,000 per claim.

Substitute the following paragraph 11.3.7 for 11.3.7.

11.3.7 Waivers of Subrogation. If permitted by the Owner's and Contractor's insurance companies, without penalties, the Owner and Contractor waive all rights against (1) each other and any of their Subcontractors, Sub-subcontractors, agents, and employees, each of the other, and (2) the Architect, Architects, consultants, separate contractors described in Article 6, if any, and any of their Subcontractors, Sub-subcontractors, agents, and employees, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this Paragraph 11.4 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Engineer, Engineer's consultants, separate contractors described in Article 6, if any, and the Subcontractors, Sub-subcontractors, agents, and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

Add the following Subparagraph 11.4.3 and 11.4.4 to 11.4:

11.4.3 The Contractor, before commencing the Work, shall furnish a Performance Bond and a Labor and Material Payment Bond. The Performance Bond shall be in an amount equal to (100) percent of the full amount of the Contract Sum as security for the faithful performance of the obligations of the Contract Documents, and the Labor and Material Payment Bond shall be in an amount equal to (100) percent of the full amount of the Contract Sum as Security for the payment of all persons performing labor and furnishing materials in connection with the Contract Documents. Such bond shall be on AIA Document A-312, issued by the American Institute of Architects, shall be issued by a Surety satisfactory to the Owner, shall name the Owner as a primary co-obligee, and shall be licensed in the State in which the project is located.

11.4.4 The surety shall be listed on the current U.S. Department of the Treasury Circular 570.

Add the following Paragraph 11.5 to Article 11:

11.5 Miscellaneous Requirements

11.5.1 All insurance coverage shall be provided by insurance companies having policy holder ratings no lower than "A" and financial ratings not lower than "XII" in the Best's Insurance Guide, latest edition in effect as of the date of the Contract.

11.5.2 The Contractor is responsible for determining that Subcontractors are adequately insured against claims arising out of or relating to the Work. The premium cost and charges for such insurance shall be paid by each Subcontractor.

11.5.3 The limits of liability as stated, may be arrived at using a Split-Limit or a Combined Single Limit basis. However, the total limit of liability shall not be less than that stated in the requirements.

I. Article 13 - Miscellaneous Provisions

Add the following Paragraph 13.8 to Article 13:

13.8 Equal Opportunity

13.8.1 The Contractor shall maintain policies of employment as follows:

13.8.1.1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, political persuasion, age, weight, height, physical disability, or marital status. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, national origin, political persuasion, age, weight, height, physical disability, or marital status. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of nondiscrimination.

13.8.1.2 The Contractor and the Contractor's Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, national origin, political persuasion, age, weight, height, physical disability, or marital status.

13.8.1.3 The Contractor and the Contractor's Subcontractors shall comply with all applicable laws of the State of Michigan for work, particularly those relating to equal employment opportunity and fair employment practices.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 00 73 00

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SECTION 01 11 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work covered by the Contract Documents includes the Work of all trades required and all the labor, equipment, materials, and supervision necessary and incidental to the repairs of the City of Plymouth Central Parking Structure in Plymouth, Michigan.

B. The Work includes the following major items:
   1. New concrete footing and column to support pedestrian bridge.
   2. Excavation and site restoration at new footing/column.
   3. Repair of miscellaneous concrete delaminations and spalls.
   4. Replacement of exterior steel stair at pedestrian bridge.
   5. Joint sealant and traffic coating repairs.
   6. Replacement of floor drains.
   7. Miscellaneous electrical work.

C. It shall be understood that where additional Work is described, but not specifically located and/or indicated on the Drawings, the Contractor shall be responsible for locating and marking areas to be repaired.

1.3 TYPE OF CONTRACT

A. Construct the Work of this Contract under a single lump price Contract.

1.4 GENERAL

A. Imperative Language: These Specifications (Divisions 01 through 32) are written in the imperative and abbreviated form. This imperative language of the technical specifications is directed at the Contractor unless specifically noted otherwise. Incomplete sentences shall be completed by inserting "shall", "shall be" and similar mandatory phrases by inference in the same manner as they are applied to notes on the Drawings. The words "shall", "shall be" and similar mandatory phrases shall be supplied by inference where a colon (:) is used within sentences or phrases. Except as worded to the contrary, fulfill (perform) all indicated requirements whether stated in the imperative or otherwise.

B. Related Sections: Some Sections of these Specifications (Divisions 01 through 32) may include a paragraph titled "Related Sections". This paragraph is an aid to the Project Manual user and is not intended to include all Sections which may be related. It is the Contractor's obligation to coordinate all Sections whether indicated under "Related Sections" or not.

C. Reference to the General Conditions: In Divisions 01 through 32, a reference to the General Conditions includes by inference all amendments or supplements in the Supplementary Conditions.

D. Furnish, Install, Perform, Provide:
   1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the site (or some other specified location) ready for use or installation and in usable or operable condition.
   2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of the Contractor, “provide” is implied.

1.5 WORK BY OTHERS

A. The Owner may have other Work occurring within the parking structures at the same time as this Project. This Contractor shall cooperate at all times with the Owner to ensure that all Work proceeds without delay to scheduled completion.

1.6 CONTRACTOR USE OF PREMISES

A. Limit use of premises to allow for Owner occupancy and public access.

B. Coordinate use of premises under direction of the Owner.

C. Where the Contract Documents identify certain site elements within the construction limits, such as sidewalks, drives, and streets, that must be kept open for public or the Owner’s use during construction, the Contractor shall be responsible for protection and maintenance of such elements as well.

D. Except in connection with the safety or protection of persons or the Work or property at the site or adjacent thereto, all Work at the site shall be restricted to the following dates and hours:
1. Monday through Friday (except legal holidays): 7 a.m. to 5 p.m.
2. Saturday, Sundays, or legal holidays with written special approval of the Owner.

1.7 OCCUPANCY REQUIREMENTS

A. Owner Occupancy During Construction:
1. The Owner will occupy or utilize the premises during the entire period of construction for conduct of the Owner’s normal operations. Coordinate with the Owner to minimize conflict and to facilitate the Owner's operations.
2. Access to Abutting Properties: Provide at all times.
3. Access for Emergency Vehicles:
   a. Provide at all times.
   b. Provide at least one clear lane during nonwork periods.
4. Fire Hydrants: Provide access to at all times.
5. Do not block fire/emergency access routes from parking structure and abutting properties.
6. Limit parking for construction vehicles to an area located within work areas.

1.8 WORK SEQUENCE

A. Prior to commencement of Work, coordinate construction schedule and operations with the Owner and Engineer.

B. Notify Owner at least 24 hours prior to beginning any demolition or abrasive blasting operations.

C. Remove all removed concrete and debris from areas exposed to public view and dispose.

D. Remove dust and debris created by demolition from the remainder of the facility at the conclusion of operations.

E. Sequence Submittal: Submit a proposed Phasing Plan with appropriate times of starting and completion of tasks/closures to the Engineer and Owner for review.

1.9 CONTRACTOR LOG

A. Furnish and maintain 1 logbook at the Project site. Enter into this log each day:
   1. Weather conditions and temperature.
   2. General progress of the Project.
   3. Materials received.
   4. Amount of materials placed.
   5. Tests performed.
   6. Inspections made by other authorities.
   7. All visitors to the Project site.
   8. Unresolved problems.

B. Submit for record one copy of the log to the Engineer weekly.

1.10 EXAMINATION OF SITE

A. Visit the site of the Work, compare the Drawings and Specifications and other Contract Documents with existing conditions. Failure to visit the site will in no way relieve the Contractor from the necessity of furnishing of materials or performing any work that may be required to complete the work in accordance with the Contract Documents.

B. Where the installation of new construction is dependent on existing dimensions, the Contractor will be responsible for the verification of existing dimensions prior to the construction or fabrication of materials.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 11 00

SECTION 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the administration of substitutions and Product options.

1.3 SUBMITTALS

A. List of all Products proposed for installation:
   1. Submit electronic copies within 30 days after the date of the Owner’s signature on the Agreement Supplement, unless otherwise indicated elsewhere in the Contract Documents.
   2. Tabulate the list by each Specification Section.

1.4 CONTRACTOR'S OPTIONS

A. Products specified only by reference standards or by description:
   1. Select any Product meeting the standards or description by any Supplier unless otherwise required elsewhere in the Contract Documents.
   2. Submit for the Engineer's review:
      a. Name and address of Supplier.
      b. Trade name.
      c. Model or catalog designation.
      d. Manufacturer's data including:
         1) Performance and test data.
         2) Compliance with reference standards.

B. Products specified by naming one or more suppliers without an "Or Equal" Clause:
   1. Use specified Product of one of the Suppliers named.
   2. No substitutions.

C. Products specified by naming one or more suppliers with an "Or Equal" Clause:
   1. Indicates the option of selecting equivalent Products by stating "or equal" after the specified Suppliers.
   2. The Engineer may waive some or all of the requirements specified for substitutions if, at the Engineer's sole discretion, the proposed equivalent Product is considered an "or equal".
   3. If, at the Engineer's sole discretion, the proposed equivalent Product does not qualify as an "or equal", it will be considered as a proposed substitute and a substitution request submittal will be required.

1.5 SUBSTITUTIONS

A. Substitutions after the date of the Owner’s signature on the Agreement Supplement:
   1. Within 30 days after the date of the Owner’s signature on the Agreement Supplement.
   2. The Engineer will consider formal requests for substitution of Products in place of those specified unless otherwise prohibited elsewhere in the Contract Documents.

B. Substitution Request Submittals: Submit an electronic copy of the request for substitution including the following:
   1. Complete data substantiating compliance of the proposed substitution with the Contract Documents.
   2. For Products:
      a. Names and addresses of Manufacturer and Supplier.
      b. Product identification.

c. Manufacturer's literature, including:
   1) Product description.
   2) Performance and test data
   3) Reference standards.
d. Samples.
e. Name and address of similar projects on which the Product was used and date of installation.

3. For Construction Methods:
   a. Detailed description of the proposed method.
   b. Drawings illustrating methods.
4. Itemized comparison of proposed substitution with Product or method specified.
5. Data relating to changes in the construction schedule.
6. Accurate cost data on the substitution and comparison with the Product or method specified.
7. Changes to the Work which would be caused by the substitution.

C. Contractor's Responsibilities: In making a request for a substitution, the Contractor represents:
   1. The Contractor has personally investigated the proposed Product or method and determined that it is equal or superior in all respects to that which is specified.
   2. The Contractor will provide the same guarantee for the substitution as for the Product or method specified.
   3. The Contractor will coordinate installation of the accepted substitution into the Work making such changes as may be required for the Work to be completed in all respects.
   4. The Contractor waives all claims for additional cost related to the substitution which consequently become apparent.
   5. Cost data is complete and includes all related costs under the Contractor's contract, but excludes costs under separate contracts and the Engineer's redesign costs.

D. Substitutions Not Considered: Substitutions will not be considered if:
   1. Requests are delivered to Engineer more than 30 days after the Owner/Contractor agreement has been signed.
   2. They are indicated or implied on Shop Drawings or Product data submittals without formal request submitted in accordance with this Section.
   3. Acceptance will require substantial revision of the Contract Documents.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 25 13

SECTION 01 26 13 – REQUESTS FOR INFORMATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedures for Contractor to give notice of conflicts, errors, ambiguities, or discrepancies in the Contract Documents.

1.3 DEFINITIONS

A. Abbreviation: Request for Information (RFI).

1.4 REQUESTS FOR INFORMATION

A. Format:
   1. Use the enclosed RFI form or, at Contractor's option, generate form.
   2. Minimum required content of Contractor's RFI form:
      a. Project name.
      b. Name and address of Contractor.
      c. RFI number.
      d. RFI date.
      e. Name of initiator.
      f. Complete written request, with sketches as required.
      g. Signature of initiator.
      h. Space for written response by Engineer, with signature and date of Engineer's representative.

B. Procedures:
   1. Maintain a log of RFIs, including the RFI date and the date of the response.
   2. Allow at least 15 full working days for Engineer's response following Engineer's receipt of RFI.
   3. Submit written justification for shorter response time.
   4. Do not submit RFIs for information already included in the Contract Documents.
   5. Illegitimate RFIs may be cause for deductions in the Contract amount. See the Supplementary Conditions.
   6. RFIs submitted directly by subcontractors or vendors will be rejected.
   7. Changes in Contract Price or Contract Times not permitted within an RFI form.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 SCHEDULES

A. Attached is the following form:
   1. Request for Information.

REQUEST FOR INFORMATION
PAGE 1 OF 1

CONTRACT FOR:	PROJECT NO.:
OWNER:	
CONTRACTOR:	
ENGINEER:	
THE CONTRACTOR SHALL COMPLY WITH THE PROCEDURES IN DIVISION 01 SECTION “REQUESTS FOR INFORMATION.”	

RFI No.: _____

Fishbeck Project Manager: _____

REQUEST		
RFI From:	**Signature:**	**Date:**

RESPONSE		
Response From:	**Signature:**	**Date:**

END OF SECTION 01 26 13

SECTION 01 29 16 – PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes submittal to the Owner's designee of Applications for Payment and supporting documentation.

1.3 PROJECT PRICING

A. Project pricing is lump sum with unit price adjustments set forth in Division 00 Section "Bid Forms."

1.4 QUANTITY MEASUREMENT FOR UNIT PRICE ADJUSTMENT

A. The Contractor’s measurement of work-in-place that involves use of established unit prices will be reviewed by the Owner and Engineer.

B. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit prices, and to have this Work measured by an independent surveyor acceptable to the Contractor at the Owner's expense.

C. Maintain plan drawings locating all unit price repairs performed. Location and size of patches, overlays, etc. must be located on clean drawings. Separate drawings shall be maintained for each level. Contractor shall submit copy of drawing identifying current quantities with each payment request. Work being invoiced must be properly identified. These drawings shall be incorporated into "Record Drawings" set required in accordance with Division 01.

D. Quantity measurements shall be performed as described in the Specifications or indicated on Drawings.

1.5 APPLICATION FOR PAYMENT

A. The form of Application for Payment shall be notarized AIA Document G702, "Application and Certification for Payment”, supported by AIA Document G703, Continuation Sheet.

B. An incomplete or incorrect Application for Payment will constitute reason for refusing to recommend payment as indicated in Article 9 of the General Conditions. Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner.

C. Submit 3 executed copies of each Application for Payment to the Engineer. One copy shall be complete, including waivers of lien and similar attachments, when required.

D. Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Values.
4. Contractor's Construction Schedule (preliminary, if not final).
5. Schedule of principal products.
6. Submittal Schedule (preliminary, if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.

9. Copies of permits.
10. Copies of authorizations and licenses from governing authorities for performance of the Work.
11. Initial progress report.
12. Certificates of insurance and insurance policies.
13. Performance and payment bonds.
14. Data needed to acquire Owner's insurance.

E. Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
1. Completion of Project closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Assurance that unsettled claims will be settled.
4. Assurance that Work not complete and accepted will be completed without undue delay.
5. Transmittal of required Project construction records to Owner.
6. Proof that taxes, fees and similar obligations have been paid.
7. Removal of temporary facilities and services.
8. Removal of surplus materials, rubbish and similar elements.
9. Warranties.

1.6 WAIVERS OF MECHANICS LIEN

A. With each Application for Payment submit waivers of mechanics liens from subcontractors or sub-subcontractors and suppliers for the construction period covered by the previous application.

B. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, and on each item.

C. When application shows completion of an item, submit final or full waivers.

D. The Owner reserves the right to designate which entities involved in the Work must submit waivers.

E. Submit waivers of lien on forms and executed in a manner acceptable to the Owner.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 29 16

SECTION 01 31 13 – PROJECT COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes provisions for coordination of the Work.

1.3 GENERAL COORDINATION

A. Coordinate scheduling, submittals and work of the various Sections of the Specifications to:
   1. Ensure efficient and orderly sequence of installation of interdependent construction elements.
   2. Provide for items to be installed later.

1.4 ACCEPTANCE OF CONDITIONS

A. Inspection:
   1. Prior to performing work under a Section:
      a. Carefully inspect the installed work.
      b. Verify that all such work is complete to the point where the work under that Section may properly commence.
      c. Starting of work indicates acceptance of the condition of components to which the work will be applied.
   2. Verify that all materials, equipment, and Products to be installed under a Section may be installed in strict accordance with the design and reviewed Shop Drawings.

B. Discrepancies:
   1. Resolve all discrepancies and conflicts between the trades.
   2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 31 13

SECTION 01 31 19 – PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes scheduling and administering of preconstruction and progress meetings.

B. Scheduling and Administration of Meetings:
   1. Responsibility:
      a. Preconstruction Meeting: Engineer.
      b. Progress Meetings: Engineer.
   2. Procedures:
      a. Prepare agenda.
      b. Distribute written notice and agendas of meetings in advance of the meeting date.
      c. Make physical arrangements for the meetings.
      d. Preside at meetings.
      e. Record minutes and include significant proceedings and decisions.
      f. Distribute copies of the minutes after meetings to:
         1) Participants.
         2) Others affected by proceedings.

1.3 PRECONSTRUCTION MEETING

A. Schedule: Preconstruction meeting will be scheduled by the Engineer:
   1. Within 21 days after the date of the Owner’s signature on the Agreement Supplement.
   2. Before starting the Work at the site.

B. Attendance:
   1. Representatives of the following parties are to attend the meeting:
      a. Owner's representatives.
      b. Engineer's representatives.
      c. Contractor's project manager.
      d. Contractor's field superintendent.
      e. Major subcontractors.

1.4 PROGRESS MEETINGS

A. Types of Progress Meetings:
   1. Regular.
   2. Called.
   3. Preinstallation for the following:
      a. Prior to concrete pours.
      b. Prior to installation of traffic coatings and concrete sealers.

B. Schedule meetings as follows unless otherwise approved by the Engineer:
   1. Regular: Bi-weekly.
   2. Called: As the progress of the Work dictates.
   3. Preinstallation: At least 5 working days prior to start of installation.

C. Location: Hold meetings at Project Site or as indicated in the notice.

D. Attendance: Representatives of the following parties are to be in attendance at the meeting:
   1. Engineer's representatives.
   2. Contractor's project manager.
   3. Contractor's field superintendent.
   4. Major Subcontractors as pertinent to the agenda.
   5. Owner's representative as appropriate.

E. Minimum Agenda: The minimum agenda for progress meetings shall consist of the following:
   1. Review and approve minutes of previous meetings.
   2. Review progress of the Work since the previous meeting.
   3. Note field observations, problems and decisions.
   4. Identify problems which impede planned progress.
   5. Review offsite fabrication problems.
   6. Develop corrective measures and procedures to regain planned schedule.
   7. Revise construction schedule as indicated.
   8. Review submittal schedules; expedite as required to maintain schedule.
   9. Maintenance of quality and work standards.
   10. Review changes proposed by the Owner for their effect on the construction schedule and completion date.
   11. Identify all claims and potential claims.
   12. Pending changes and substitutions.
   13. Complete other current business.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 31 19

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedures for the submittal of Shop Drawings, Product Data, Samples, Operation and Maintenance Manuals, and other information.

B. Related Sections include pertinent Sections of these Specifications for the individual Submittals required.

1.3 DEFINITIONS

A. Submittal: Information sent by Contractor to convey information about systems, equipment, materials, products, and administrative matters for the Work.

B. Resubmittal: Submittal sent for review a second or further time.

C. Product Data: Illustrations, standard schedules, diagrams, performance charts, instructions, brochures, or manufacturer's literature that describe the physical size, appearance, and other characteristics of materials or equipment for a portion of the work.

D. Shop Drawings: All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

E. Samples: Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

F. Action Submittals: Submittal that requires Engineer's response.

G. Informational Submittals: Submittal that does not require Engineer's response.

H. Delegated-Design: In certain individual Specification Sections, design services or certifications by a design professional are specifically delegated to the Contractor. Performance and design criteria are defined in the individual Specification Sections or on the Drawings. Contractor is solely responsible for design of those items or systems, coordination of the design with the balance of the Project, and achieving specified performance.

I. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format. All PDF files shall be searchable.

1.4 SUBMITTAL PROCEDURES

A. Submittal Schedule:
   1. Prepare and submit a Submittal schedule that identifies the following for each Submittal:
      a. Submittal number
      b. Submittal description
      c. Projected date Submittal will be submitted.
   2. An electronic copy (MS Excel file) of a blank Submittal schedule, in the preferred format, will be furnished by Engineer at the preconstruction meeting.

3. Submittal Numbers:
    a. Use the applicable Specification Section number followed by a decimal point and then a sequential number (e.g., 06 10 00.1). Where a Submittal is required via a Drawing (instead of a Specification Section), use the applicable Drawing Number followed by a decimal point and then a sequential number (e.g., M501.1.1).
    b. Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 10 00.1.A).
    c. Submittals that are not numbered correctly may be rejected.

B. Delivery Method:
1. Electronic Files:
    a. Unless indicated otherwise, submit 1 copy of each Submittal in a format capable of being read using Adobe Acrobat Reader.
    b. Scanned Submittals shall be produced in such a way as to not compromise the graphic quality or accuracy of scale, where applicable; and text shall be searchable.
    c. One copy of each Action Submittal will be returned to Contractor.
    d. Transmit Submittals via electronic mail (e-mail) or web-based collaboration and document sharing system, where used. Submittals that are transmitted electronically will be returned electronically.
2. Transmit Submittals to party and address identified by Engineer at preconstruction meeting.

C. Coordination and Timing: Coordinate preparation and processing of Submittals with performance of construction activities. Contractor is responsible for cost of delays caused by lack of coordination or tardiness of Submittals. Incomplete Submittals will be rejected.
1. Coordinate each Submittal with fabrication, purchasing, testing, delivery, other Submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of Submittals for related parts of the Work so processing will not be delayed because of need to review Submittals concurrently for coordination.
    a. Engineer reserves the right to withhold action on a Submittal requiring coordination with other Submittals until related Submittals are received.

D. Processing Time: Allow 10 full working days for Engineer to review each Submittal, including Resubmittals. Time for review shall commence on Engineer’s receipt of Submittal. No extension of the Contract Time will be authorized because of failure to transmit Submittals enough in advance of the Work to permit processing, including Resubmittals. Engineer will advise Contractor when a Submittal being processed must be delayed for coordination.

E. Identification: Place a permanent label on each Submittal or generate a separate cover sheet.
1. Indicate name of firm or entity that prepared Submittal.
2. Provide space to record Contractor's review and approval markings and action taken by Engineer.
3. Include the following information:
    a. Project name.
    b. Date.
    c. Name and address of Engineer.
    d. Name and address of Contractor.
    e. Name and address of Subcontractor(s).
    f. Name and address of Supplier(s).
    g. Name of Manufacturer.
    h. Submittal number, including revision identifier.
    i. Drawing number and detail references, as applicable.
    j. Location(s) where product is to be installed, as applicable.
    k. Other necessary identification.

F. Deviations: Encircle or otherwise specifically identify deviations from the Contract Documents on Submittals. Submittals that include deviations that are not identified may be rejected. Engineer may or may not consider deviations. Deviations are not substitutions. Refer to Division 01 Section “Product Substitution Procedures” for procedures regarding requests for substitutions.

G. Transmittal: Package each Submittal individually and appropriately for transmittal and handling. Transmit each Submittal using a transmittal form. Engineer will reject Submittal(s) received from sources other than Contractor.

H. Resubmittals: Make Resubmittals in same form and number of copies as initial Submittal.
   1. Note date and content of previous Submittal.
   2. Clearly identify additions and revisions.
   3. Resubmit Submittals until they are marked, “Reviewed, No Exceptions Noted” or “Reviewed With Corrections Noted.”

I. Distribution: Furnish copies of Submittals with mark indicating, “Reviewed, No Exceptions Noted” or “Reviewed With Corrections Noted,” to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities.

J. Use for Construction: Unless otherwise indicated by Engineer, use only Submittals with mark indicating, “Reviewed, No Exceptions Noted” or “Reviewed With Corrections Noted.”

1.5 CONTRACTOR'S USE OF ENGINEER’S ELECTRONIC DRAWING FILES

A. At Contractor's written request, copies of Engineer’s electronic Drawing files may be provided to Contractor for Contractor's use in connection with Project, including Submittal preparation. Electronic files may be furnished by Engineer for the convenience of the Contractor. Conclusions or information obtained or derived from such electronic files will be at the Contractor’s sole risk. Materials furnished by Engineer that may be relied upon are limited to printed Contract Documents.

B. When Contractor uses Engineer’s electronic Drawing files to facilitate Submittal preparation, prepare Submittals to be project specific. Submittals that are not project specific, including Engineer’s Drawing files submitted on a new title block, will be rejected.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit project specific Action Submittals required by individual Specification Sections. Do not use highlighting that would not be reproducible. Include a table of contents or index with each Submittal.

B. Product Data: Collect information into a single Submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for Submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each Submittal to indicate which products and options are applicable.
   3. Include the following information, as applicable:
      a. Manufacturer's written recommendations.
      b. Manufacturer's product specifications.
      c. Manufacturer's installation instructions.
      d. Standard color charts.
      e. Manufacturer's catalog cuts.
      f. Wiring diagrams showing factory-installed wiring.
      g. Printed performance curves.
      h. Operational range diagrams.
      i. Mill reports.
      j. Standard product operation and maintenance manuals.
      k. Compliance with specified referenced standards.
      l. Testing by recognized testing agency.
      m. Application of testing agency labels and seals.
      n. Notation of coordination requirements.
   4. Submit Product Data before or concurrent with Samples.
   5. Maintain copy of returned Submittal for Project records.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale where appropriate. Scale shall be sufficiently large to indicate pertinent features of the item and its method of connection to the Work.
   1. Preparation: Fully illustrate requirements of the Contract Documents. Include the following information, as applicable:
      a. Dimensions.
      b. Identification of products.
      c. Fabrication and installation drawings.
      d. Roughing-in and setting diagrams.
      e. Wiring diagrams showing field-installed wiring, including power, signal, control, and communication wiring. Differentiate between Manufacturer-installed and field-installed wiring.
      f. Manufacturing instructions.
      g. Templates and patterns.
      h. Schedules.
      i. Calculations.
      j. Compliance with specified standards.
      k. Notation of coordination requirements.
      l. Notation of dimensions established by field measurement.
      m. Relationship to adjoining construction clearly indicated.
   2. Sheet Size: Submit Shop Drawings on sheets at least 8-1/2 x 11 inches but no larger than 24 x 36 inches.
   3. Maintain copy of returned Submittal for Project records.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by individual Specification Sections. Do not use highlighting that would not be reproducible. Include a table of contents or index with each Submittal. As part of electronic submittals, the table of contents or index shall include electronic bookmarks to the first page of the respective Section(s) identified.

B. Contractor's Construction Schedule: Prepare and submit within 10 days after the date of the Owner's signature on the Agreement Supplement an estimated construction progress schedule in bar chart form. Extend schedule from date established for the execution of the Contract to date of final completion.
   1. Prepare a list of all activities required to complete the work. Identify critical path activities, including material lead time. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.
   2. Coordinate construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
   3. Schedule shall include provisions for submittal review time, resubmittal review time, procurement time, material cure time, adverse weather, and constraints and work restrictions in the Contract Documents.
   4. Schedules for restoration work shall indicate the areas to be closed during each phase of construction and shall indicate the proposed traffic flow for each phase.

C. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects/engineers and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on Manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by Manufacturer for this Project.

G. Manufacturer Certificates: Prepare written statements on Manufacturer's letterhead certifying that Manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. Product Certificates: Prepare written statements on Manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

I. Material Certificates: Prepare written statements on Manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Manufacturer's Instructions: Prepare written or published information that documents Manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of Manufacturer. Include the following, as applicable:
   1. Preparation of substrates.
   2. Required substrate tolerances.
   3. Sequence of installation or erection.
   4. Required installation tolerances.
   5. Required adjustments.
   6. Recommendations for cleaning and protection.

K. Manufacturer's Field Reports: Prepare written information documenting tests and inspections of factory-authorized service representative. Include the following, as applicable:
   1. Name, address, and telephone number of factory-authorized service representative making report.
   2. Statement of substrate condition and acceptability of substrate for installation or application of product.
   3. Statement that products at Site comply with requirements.
   4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   6. Statement whether conditions, products, and installation will affect warranty.
   7. Document all settings in writing.
   8. Other required items indicated in individual Specification Sections.

2.3 DELEGATED-DESIGN SUBMITTALS

A. Where design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated, which Contractor has coordinated with the balance of the Project.

B. Performance type design documents and calculations shall be prepared by a design professional as required by the individual Specification Section, licensed in the jurisdiction where the Project is being constructed. Design shall be signed and sealed by the responsible design professional. Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Identify name and version of software, if any, used for calculations.

C. In addition to Shop Drawings, Product Data, and other required Submittals, submit two copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each Submittal and check for coordination with other work of the Contract and for compliance with the Contract Documents. Verify all field dimensions and conditions; note corrections as necessary. Mark with approval stamp before submitting to Engineer.
   1. Approval Stamp: Stamp each Submittal with an approval stamp. Use the same stamp format for each Submittal. Include Project name and location, Submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that Submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

B. Submittals that are not approved and stamped by Contractor will be rejected.

3.2 ENGINEER’S REVIEW

A. Action Submittals: Engineer will review Action Submittals, make marks to indicate corrections or modifications required, and return Submittal. Engineer will stamp each Submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
   1. Reviewed, No Exceptions Noted: Submittal appears to conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
   2. Reviewed With Corrections Noted: Upon incorporation of review comments, it appears that Submittal will conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
   3. Revise and Resubmit: Submittal has one or more specific segments that are incomplete, do not appear to conform to the information given in the Contract Documents, or are incompatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Contractor shall resubmit information for review to demonstrate understanding of comments and portions of Work to be provided. Except as noted, Contractor shall not proceed with Work related to Submittal.
   4. Rejected, Resubmit: Submittal as a whole is incomplete, does not appear to conform to the information given in the Contract Documents, or is incompatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Contractor shall resubmit information for review to demonstrate understanding of comments and portions of Work to be provided. Contractor shall not proceed with Work related to Submittal.
   5. Received for Record: Submittal for closeout document appears to conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Submittal will not be returned to the Contractor without a specific request. The Submittal has been accepted as a record document.

B. Informational Submittals: Other Submittals required by the Contract Documents are for information only. Engineer will acknowledge receipt of Informational Submittals. Such Submittals include, but are not limited to:
   1. Qualifications Data.
   2. Certificates.
   3. Test Reports.
   4. Manufacturer’s Instructions.
   5. Maintenance Data.
   6. Field Reports.

C. Delegated-Design Submittals: Review of Delegated-Design Submittals by Engineer shall not relieve Contractor of Contractor’s sole responsibility for design and achieving specified performance.

D. Submittals not required by the Contract Documents will be returned without being reviewed.

E. Partial Submittals are not acceptable, will be considered non-responsive, and will be rejected.

3.3 RE-REVIEW COSTS

A. Compensation:
   1. Should Engineer be required to review a Submittal more than twice because of failure of the Submittal to meet the requirements of the Contract Documents, Engineer will record Engineer's expenses for performing all additional reviews.
   2. Owner will compensate Engineer for these additional services and deduct the amount paid from payments to Contractor.

END OF SECTION 01 33 00

SECTION 01 41 00 – TESTING LABORATORY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes provisions for requirements for an independent testing laboratory to perform testing.

B. Division of Work:
   1. Owner will employ and pay for services of an independent testing laboratory to perform testing.
   2. Contractor will pay costs for all re-tests and related engineering services which indicate that initial tested items are not in accordance with Contract Documents, and for additional tests that are for the Contractor's convenience.
   3. Employment of laboratory will in no way relieve Contractor's obligations to perform Work of Contract.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ACI - American Concrete Institute:
      a. 311.5R-02 – Guide for Concrete Plant Inspection and Testing of Ready-Mixed Concrete.
      b. SP 15 – Field Reference Manual.
   2. ASTM Standards:
      a. C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
      b. C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
      c. C109 - Standard Test Method for Comprehensive Strength of Hydraulic Cement Mortars.
      d. C138 - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
      e. C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
      f. C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
      g. C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
      h. C457 - Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete.
      i. C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
      j. C1019 - Standard Test Method for Sampling and Testing Grout for Masonry.
      k. C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
      l. D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
      m. D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort'
      n. D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
      o. D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods.

1.4 SUBMITTALS

A. All tests will be reported in writing to Contractor, Subcontractor, Supplier, Installer, etc., Engineer, and Owner. Written reports of test results will be delivered to above parties within 48 hours of testing or by electronic mail if immediately requested. Each report will include, as a minimum, following:
   1. Report number
   2. Date issued
   3. Project title and number

4. Name of Contractor and Subcontractor if applicable
5. Supplier
6. Testing Laboratory name, address, and telephone number
7. Name and signature of Laboratory Field Technician
8. Date and time of sampling or inspection
9. Record of temperature and weather conditions
10. Date of test
11. Identification of product and Specification Section
12. Location of sample or test in Project
13. Type of inspection or test
14. Results of tests and compliance with Contract Documents
15. Interpretation of test results when requested by Engineer

1.5 QUALITY ASSURANCE

A. Laboratory will meet requirements of ASTM C1077.

B. Laboratory will have been inspected by an independent agency such as Cement and Concrete Reference Laboratory CCRL or AASHTO Material Reference Laboratory AMRL.

C. Laboratory will meet "Recommended Requirements for Independent Laboratory Qualification," published by American Council of Independent Laboratories.

D. Laboratory will be authorized to operate in state in which Project is located.

E. An ACI certified Concrete Laboratory Testing Technician - Grade II will be responsible for concrete testing services.

F. An ACI certified Concrete Construction Inspector will be responsible for concrete inspection services.

G. An ACI certified Concrete Field Testing Technician - Grade I will be responsible for field testing services.

H. Technicians performing field tests will have available to them a copy of ACI SP-15. Field Reference Manual: Specifications for Structural Concrete for Building with Selected ACI and ASTM References.

I. Weld Inspectors will be AWS Certified Welding Inspector per AWS QCI. Inspectors performing nondestructive testing of welds other than visual will be NDT Level II per American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A.

1.6 TESTS

A. Excavating, Backfilling and Compaction:
   1. Determine suitability of all materials to be used as fills, backfills, and leveling beds.
   2. Perform one optimum moisture-maximum density curve in accordance with ASTM D1557 for each type of soil proposed for use.
   3. One field density test for each 2500 square feet or fraction thereof of each in-place fill layer in accordance with either ASTM D1556, D2167, or D2922.
   4. Provide daily inspection and reports for compaction work.
   5. Confirm adequacy of bearing conditions for following:
      a. Slab-on-Grade
      b. Footings

B. Cast-In-Place Concrete (ACI 301 1.6.4 and ACI 311.5R-1.3, 2.4): Comply also with testing requirements established in governing building codes. Additional requirements are specified as follows:
   1. Concrete Compression ASTM C39.
      a. Laboratory will have a compression machine capable of breaking 6-inch x 12-inch cylinders of 10,000 psi or be prepared to test 4-inch x 8-inch cylinders in accordance with ASTM standards.
      b. Compression test sample size will be 6-inch x 12-inch cylinders or 4-inch x 8-inch cylinders.
      c. Take a minimum number of test cylinders as listed for each 50 cubic yards, or fraction thereof, of each mix design of concrete placed in any one day.
         1) 6-inch x 12-inch Cylinders: 4 cylinders.
         2) 4-inch x 8-inch Cylinders: 6 cylinders.
      d. Compression Tests:
         1) Test 1 cylinders at 7 days.
         2) Test 2 cylinders at 28 days (3 cylinders for 4-inch x 8-inch cylinders).
         3) Hold 1 cylinder in reserve for use as the Engineer directs (2 cylinders for 4-inch x 8-inch cylinders).
      e. After 56 days, unless notified by the Engineer to the contrary, reserve cylinders may be discarded without being tested for specimens meeting 28 day strength requirements.
   2. Slump Test:
      a. Conduct one slump test per batch at the point of placement ASTM C143.
      b. When water reducing admixtures or high range water reducing admixtures are added at job site, test concrete slump prior to addition of admixtures.
   3. Air Content Testing:
      a. Sample and test each batch of air entrained concrete delivered to project ASTM C173 or ASTM C231 and ASTM C138.
   4. Ambient Air Temperature and Composite Concrete Sample Temperature.
      a. Record temperatures for each batch of concrete ASTM C 1064.
   5. Submit for record field test reports including following information ACI 311.5R 2.5:
      a. Project information as specified herein
      b. Design mix number
      c. Design strength
      d. Cement content
      e. Water content
      f. Coarse aggregate lbs/yd
      g. Fine aggregate lbs/yd
      h. Admixtures
      i. Truck number and/or ticket number
      j. Drum rotation revolution
      k. Cubic yards
      l. W/C ratio
      m. Batch time
      n. Discharge start time
      o. Empty time
      p. Sample time
      q. Slump
      r. Air content
      s. Air temperature and concrete temperature
      t. Location of placement and location of sample batch
   6. Submit for record laboratory test results including following information in addition to information cited under field tests.
      a. Cylinder identification
      b. Date tested, concrete age
      c. Total load
      d. Compressive strength
      e. Type of fracture
      f. Method of curing
      g. Weight of cylinder

C. Concrete Reinforcement:
   1. Prior to concrete placement verify the following:
      a. Reinforcements are shipped, handled, and stored as specified.
      b. Tie wire, chair, and support systems (location, spacing, material).
      c. Epoxy coating for conventional reinforcement is free of damage and damaged coating is repaired in conformance with Contract Documents.
      d. Conventional steel is correctly placed, including proper number, location, cover, supports, and splices.
   2. During concrete placement verify following:
      a. Forms are clean, free of cut bars, tie wire, saw dust, debris, etc. before concrete placement.
      b. Inserts, sleeves, and blockouts for mechanical, electrical, and precast concrete work are installed at proper location and sizes.
      c. Expansion joint blockouts at proper location and size.
      d. Concrete placement does not displace position of reinforcement or tendons and pump lines are independently supported.
      e. Concrete is properly consolidated, especially in areas of reinforcement congestion and tendon anchorage to eliminate voids and honeycombing. Verify vibrators are not laid on tendons and reinforcement.
      f. Water is not added to concrete trucks at job site without prior approval of Engineer.
      g. Spraying of water directly on slab surface does not occur during fogging operations.
      h. Concrete placement and finishing procedures are in compliance with Contract Documents and as agreed during prepour meeting.
      i. Cold weather and hot weather concreting practices are followed as specified.
      j. Finishing and jointing procedures are followed as specified.
      k. Wet cure practices are followed as specified.

D. Miscellaneous Metals
   1. All welds will be visually inspected. Twenty-five (25) percent at random will be measured.
   2. Test 15 percent of all fillet welds at random by magnetic particle for final pass only.
   3. Ultrasonically test 100 percent of all full-penetration welds.
   4. Ultrasonically test 100 percent of all partial penetration column splice welds.
   5. Monitor installation of bolts to determine that in bearing type connections, all plies of connected material have been drawn together and that selected procedure is properly used to tighten all bolts.

E. Post-installed Anchors
   1. Verify the following:
      a. Anchor type
      b. Anchor material
      c. Anchor size and length
      d. Hole drilling method, drill bit type and size,
      e. Hole cleaning procedures
      f. Anchor installation and setting procedures in accordance with the manufacturer’s published installation instructions.
      g. Anchor installation locations in accordance with construction documents and manufacturer’s published installation instructions.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 41 00

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of the construction facilities as follows:
   1. Temporary utilities: Water, electricity, and telephone.
   2. Sanitary facilities.
   3. Temporary heat.
   4. Project signs.
   5. Enclosures such as tarpaulins, barricades and canopies.
   6. Storage areas.

1.3 STORAGE AREAS

A. Locations:
   1. Carefully coordinate with the Owner.
   2. Subject to approval of the Owner.

B. Protection and Restoration:
   1. Protect trees and shrubs in the storage areas.
   2. Replace grass and other vegetation disturbed or damaged in the storage areas.
   3. Take reasonable means to prevent spillage of fuel, oil, chemicals and similar materials.
   4. Clean up spills and, if necessary, remove soil and replace with uncontaminated soil so as to allow vegetation to be quickly reestablished.
   5. Provide secondary containment for storage of hazardous materials, as required by governing authorities or agencies.

C. Cleaning: Keep storage areas clean in accordance with Division 01 Section “Cleaning and Waste Management.”

D. Storage: Maintain in accordance with Division 01 Section “Product Storage and Handling Requirements.”

1.4 CONSTRUCTION LOADS

A. Maximum construction loads of 30 pounds per square foot will be allowed on the parking structure during construction.

1.5 USE OF PARKING AREAS

A. Contractors shall not provide parking for their employees and subcontractors on the premises outside their work areas without paying for the spaces.

1.6 JOBSITE DOCUMENTS

A. The most recent copies of the following documents shall be maintained at the jobsite:
   1. Construction Drawings and Specifications, including all changes made by addenda, bulletins, and change orders.
   2. Approved submittals.
   3. Health and Safety Data Sheets.
   4. Obsolete or unapproved submittals and health and safety data sheets shall not be kept at the jobsite.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
1. New or used.
2. Adequate in capacity for the required usage.
3. Provide safe conditions.
4. Comply with requirements of applicable codes and standards.

2.2 UTILITIES

A. Temporary Utilities:
1. Water:
a. The Owner will pay for water usage charges.
b. Furnish, install, remove and pay for all temporary piping, water meters, equipment and connections.
c. Obtain water by connection to the Owner's existing water system.
2. Electricity:
a. The Owner will pay for electrical usage charges.
b. Furnish, install, remove and pay for all temporary wiring, equipment switches, panels, connections and transformers.
c. Furnish, install, remove, and pay for area distribution boxes so located that power and artificial lighting are available at all points where required by the Work.
d. Obtain electrical power by connecting to the Owner's existing system.
3. Construction Telephones: No telephones will be provided by Owner.
4. Existing Utilities: Do not disturb existing utilities servicing adjacent building without written permission from the Owner.

2.3 SANITARY FACILITIES

A. Furnish and install required sanitary facilities, including temporary sanitary toilets and hand sanitizing stations, for use of workers; comply with minimum requirements of the Health Department or other public agency having jurisdiction; maintain in a sanitary condition at all times.

2.4 CONSTRUCTION HEATING

A. General:
1. All heating required during the progress of the Work shall be classified "temporary heat".
2. Furnish approved heaters and fuel as required by construction activities, for storing temperature-sensitive materials, for installing materials, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity
3. Keep equipment and surroundings in clean, safe condition.
4. Pay all fuel bills for heat.

B. Temperatures:
1. Except as otherwise called for, a minimum temperature of 50 degrees F in the parking structure.
2. See requirements of various other Sections of these Specifications for minimum temperature to be maintained for the application of work under the various trades.

2.5 FIRE PROTECTION

A. Provide adequate fire protection and fire prevention for the Project and in no case less than that required by applicable City, County, State, and Federal Laws.

2.6 OTHER TEMPORARY CONSTRUCTION FACILITIES

A. Furnish, install, and maintain all other temporary construction facilities necessary for proper completion of the Work.

PART 3 - EXECUTION

3.1 GENERAL

A. Comply with applicable requirements specified in Local Building Code.

B. Maintain and operate systems to ensure continuous service.

C. Modify and extend systems as Work progress requires.

3.2 DUST AND FUME CONTROL

A. Contractor shall take all necessary precautions to keep dust confined in the present work area.

B. Contractor shall be responsible for any damage to vehicles due to the construction.

C. Contractor shall submit to the Owner, for approval, proposed methods used to contain dust and fumes in work area.

D. Prevent hazardous accumulations of dusts, fumes, mists, vapors or gases in areas occupied during construction. Provide local exhaust ventilation to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas. Dispose in manner that will not result in harmful exposure to persons. Ventilate storage spaces containing hazardous or volatile materials.

E. Water shall be used during concrete removal, saw cutting, etc. to contain dust.

3.3 DEBRIS CONTROL

A. Contractor shall remove all debris from areas exposed to public view on a weekly basis or more often as required to maintain a neat, clean site and dispose of same at authorized dump sites.

3.4 NOISE CONTROL

A. Contractor shall review with the Owner the types of equipment which he proposes to use during

B. normal business hours and obtain Owner's approval for such use.

C. Conform with local city noise ordinance.

3.5 TEMPORARY CONTROLS

A. Traffic Control:
   1. Provide adequate warning lights, signs, barricades and flagmen; take all necessary precautions for the protection of the Work, and the safety of the general public.
   2. Lights, signs and barricades shall conform to the Michigan Manual of Uniform Traffic Control Devices.
   3. All lights, signs, barricades and other protective devices shall be installed and maintained in conformity with applicable statutory requirements and, where within rights-of-way, as required by the authority having jurisdiction thereover.

B. Detours:
   1. Shall be approved by the Owner and highway authority having jurisdiction prior to closing any road.
   2. The Contractor shall secure above approvals and comply with all conditions thereof at the Contractor's expense.

3.6 REMOVAL

A. Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the Work. Remove all such temporary facilities and controls as rapidly as progress of the Work will permit.

END OF SECTION 01 50 00

SECTION 01 55 26 – TRAFFIC CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the major items listed below:
   1. Maintaining traffic and parking.
   2. Temporary facilities for:
      a. Maintaining vehicular access.
      b. Maintaining pedestrian access.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. MDOT:
      a. 2003 Standard Specifications for Construction.
      b. Standard Plans.
      c. Part 6 of the Michigan Manual of Uniform Traffic Control Devices, as amended.

1.4 DEFINITIONS

A. Abbreviation for Michigan Manual of Uniform Traffic Control Devices: MMUTCD.

B. Terms:
   1. Traffic: Includes all users of the roadway, motorized and non-motorized.
   2. Traffic Control Device: Includes, but is not limited to, signs, pavement markings, traffic signals, traffic channelizing devices, flagging devices, and other devices designed to provide orderly and predictable movement of traffic, and assist vehicle operators in vehicle guidance and navigation tasks.

1.5 SEQUENCING AND SCHEDULING

A. Coordination with Construction Sequencing and Schedule:
   1. This section is coordinated with sequencing and scheduling proposed in Division 01 Section “Summary of Work.”
   2. Adjustments to the proposed sequencing and scheduling may require changes to work described in this section, which must be approved by the Engineer and Owner. Such changes shall be at no additional cost to Owner.

1.6 TRAFFIC SIGNAGE

A. Provide and maintain traffic signs through the duration of the Project to assist in traffic direction.

B. Provide signs necessary to inform visitors and employees of closings and traffic flow modifications, both inside and outside of the structure. Sign wording, appearance and placement shall be approved by Owner.

C. Work will not be permitted to proceed until required signage is in place.

1.7 MAINTENANCE

A. Extra Materials:
   1. Supplied by the Contractor at no expense to the Owner.
   2. Store on Site to replace stolen or damaged materials.

B. Maintenance Service:
   1. Inspect temporary traffic control devices daily during the course of the Work.
   2. Deficiencies in the location or condition of traffic control devices shall be corrected immediately.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials for temporary traffic control devices shall conform with the MDOT 2003 Standard Specifications for Construction and the MMUTCD, as amended

B. Frames may be new or used, wood or metal, in sound condition and structurally adequate.

C. Signs should be a minimum of 1/2-inch exterior grade plywood.

D. Minimum heights of letters should be 4 inches and stenciled.

E. Paint should be exterior quality and the color of the lettering black on a highway orange background.

PART 3 - EXECUTION

3.1 GENERAL

A. Take necessary precautions including, but not limited to, provision of necessary traffic control devices, implementation of closures, construction of temporary facilities, and maintenance of detours as necessary for the safety of the general public, efficient movement of traffic, and the protection of the Work.

3.2 MAINTAINING ACCESS

A. Provide and maintain all drive lanes, entrances, exits, and safeguards required or necessary to the progress of the Work, and effectively control such traffic in a manner to provide minimum hazard to the Work and all persons.

B. Vehicle and pedestrian traffic flow inside and outside of the structure shall be maintained to provide easy entry and exit from the structure and to all parking areas.

C. Maintain access for emergency services at all times during the Work:

D. Pedestrian Access:
   1. Conduct Work to minimize obstruction to pedestrian traffic.
   2. Barricade and fence disturbed or obstructed pedestrian facilities
   3. Restore disturbed pedestrian facilities at the earliest possible date using temporary pavement as necessary.

3.3 CLOSURES

A. Closures shall be in accordance with the MMUTCD, as specified herein.

B. Provide the Engineer and Owner a minimum of 3 weeks' notice and receive approval before implementing parking closures.

3.4 PROTECTION

A. Protect all existing traffic control devices in the work area.

B. Promptly repair or replace traffic control devices damaged by construction.

3.5 TRAFFIC SIGNAGE

A. Install signs at an optimum height for visibility, attached to frames or structural surfaces.

B. Relocate signs as required by progress of work.

C. Maintain signs neat and clean, repair damages to support or sign.

D. Remove signs, framing and supports at the completion of the project.

END OF SECTION 01 55 26

SECTION 01 66 00 – PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes provisions for the storage and protection of Products.

1.3 STORAGE AND PROTECTION

A. Storage:
   1. Maintain ample way for foot traffic at all times, except as otherwise approved by the Engineer.
   2. Repair or replace property damaged by reason of storing of material at no additional cost to the Owner.
   3. Packaged Materials:
      a. Delivered in original, unopened containers.
      b. Stored until ready for use.
   4. Materials shall meet the requirements of these Specifications at the time that they are used in the Work.
   5. Store Products in accordance with Manufacturer's instructions and as required by the technical specifications, with seals and labels intact and legible.
   6. Store fabricated products above the ground on blocking skids, prevent soiling or staining.
   7. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
   8. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

B. Protection:
   1. Use all means necessary to protect the:
      a. Products of every Section before, during and after installation.
      b. Installed work and materials of all trades.
   2. All materials shall be delivered, stored and handled to prevent:
      a. The inclusion of foreign materials.
      b. Damage by water, breakage or other causes.
   3. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
   4. Provide weathertight enclosures with raised floors as may be required to adequately protect those materials and Products stored on the site which may require protection from damage by the elements.
   5. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

C. Protection after installation: Provide substantial coverings as necessary to protect installed products from damage from weather, traffic, and subsequent construction operations. Remove when no longer needed.

D. Replacements: In the event of damage, immediately make repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 66 00

SECTION 01 74 00 – CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes provisions for maintaining all structures and the site in a standard of cleanliness.

B. Related Sections include the following: In addition to standards described in this Section, comply with all requirements for cleaning up as described in various other Sections of these Specifications.

1.3 QUALITY ASSURANCE

A. Inspection:
   1. Daily and more often if necessary.
   2. Conduct inspections to verify that requirements of cleanliness are being met.

1.4 DELIVERY, STORAGE AND HANDLING

A. Hazards Control:
   1. Volatile Wastes:
      a. Store in covered metal containers.
      b. Remove from premises daily.
   2. Prevent accumulation of wastes which create hazardous conditions.
   3. Provide adequate ventilation during use of volatile or noxious substances.

1.5 PROJECT CONDITIONS

A. Cleaning and Disposal:
   1. Conduct operations to comply with local ordinances and anti-pollution laws.
   2. Not Allowed:
      a. Burning or burying of rubbish or waste materials onsite.
      b. Disposal of volatile wastes in storm or sanitary sewers: Volatile wastes include, but are not limited to, mineral spirits, oil or paint thinner.
      c. Disposal of wastes into streams or waterways.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Compatibility:
   1. Compatible with the surface being cleaned.
   2. Recommended by the Manufacturer of the material being cleaned.
   3. As reviewed by the Engineer.

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

A. General:
1. Store materials:
a. In an orderly arrangement allowing maximum access.
b. To allow unimpeded drainage and traffic.
c. Provide for the required protection of materials.
2. Scrap, debris, waste material and other items not required for construction of the Work.
a. Do not allow accumulation.
b. Remove from the site at least each week and more often if necessary.
c. Provide adequate storage for all materials awaiting removal.
3. Observe all requirements for fire protection and protection of the environment.

B. Site:
1. Daily, and more often if necessary:
a. Inspect the site.
b. Pick up all scrap, debris and waste material; remove all such items to the place designated for their storage.
2. Weekly, and more often if necessary:
a. Inspect all arrangements of materials stored onsite.
b. Restack or otherwise service all arrangements to meet the requirements of paragraph 3.1.A.1 above.
3. At all times maintain the site in a neat and orderly condition which meets the approval of the Engineer.
4. Paved Surfaces: Keep clean.
5. Dust Control:
a. Control dust on or near the Work by the application of water or other approved means.
b. If the Contractor fails to correct unsatisfactory conditions with 24 hours after due notification:
1) The Owner may arrange for such work to be performed by other means.
2) Pay costs.

C. Structures:
1. Weekly, and more often if necessary:
a. Inspect the structures.
b. Pick up all scrap, debris and waste material; remove all such items to the place designated for their storage.
c. Sweep all interior spaces clean.
1) Clean as used above shall be defined to be free from dust and other material capable of being removed by reasonable diligence using a hand-held broom.
2. Preparation for installation of succeeding material: Clean the structures or pertinent portions thereof:
a. To the degree of cleanliness recommended by the Manufacturer of the succeeding material.
b. Using all equipment and materials required to achieve the required cleanliness.
3. Schedule cleaning operations so that dust and other contaminants resulting from cleaning operations will not fall on wet, recently painted surfaces.

3.2 FINAL CLEANING

A. Definitions:
1. Clean: The level of cleanliness generally provided by commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.

B. Prior to Completion of the Work:
1. Remove from the site all tools, surplus materials, equipment, scrap, debris and waste.
2. Conduct final progress cleaning as described in Article 3.1 above.

C. Site:
   1. Unless otherwise specifically directed by the Engineer:
      a. Hose down all paved areas onsite and all public sidewalks directly adjacent to the site.
      b. Rake clean other surfaces of the grounds.
   2. Remove all resultant debris.

D. Structures:
   1. Visually inspect all exterior surfaces.
   2. Remove all traces of soil, waste material, smudges and other foreign matter.
   3. Remove all traces of splashed materials from adjacent surfaces.
   4. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure.
   5. In the event of stubborn stains not removable with water, the Engineer may require light sandblasting or other cleaning at no additional cost to the Owner.
   6. Remove all paint droppings, spots, stains and dirt from finished surfaces using only the specified cleaning materials and equipment.
   7. Clean all glass inside and outside.

E. Timing: Schedule final cleaning as approved by the Engineer to enable the Owner to accept a completely clean Project.

END OF SECTION 01 74 00

SECTION 01 77 00 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the instructions for and the responsibilities of each party in contract closeout.

1.3 SUBSTANTIAL COMPLETION

A. Contractor: When the Contractor considers that the Work or any portion of the Work is ready for its intended use, the Contractor shall submit:
   1. Written certification to the Engineer and Owner that the Work, or designated portion of the Work, is substantially complete.
   2. A comprehensive list of items to be completed or corrected.
   3. Request that the Engineer issue a certificate of Substantial Completion.

B. Engineer's Inspection: The Engineer will make an inspection:
   1. Within 10 days after receipt of certification.
   2. Together with the Owner and Contractor.

C. Engineer's Determination of Substantial Completion:
   1. Should the Engineer consider the Work or designated portion of the Work substantially complete, the following steps shall be taken:
      a. The Contractor shall prepare and submit to the Engineer a list of items to be completed or corrected as determined by the inspection.
      b. The Engineer will prepare and deliver to the Owner:
         1) A tentative certificate of Substantial Completion.
         2) A tentative list of items to be completed or corrected before final payment.
      c. The Owner shall have 7 days after receipt of the tentative certificate during which to make written objection to the Engineer as to any provisions of the certificate or attached list.
      d. The Engineer will, within 14 days after delivery of tentative certificate to the Owner, decide:
         1) Not Substantially Complete: The Engineer will issue written notice to the Contractor stating reasons.
         2) Substantially Complete: The Engineer will issue definitive certificate of Substantial Completion and a revised list of items to be corrected or completed.
   2. Should the Engineer consider that the Work or designated portion of the Work is not substantially complete, the following steps shall be taken:
      a. The Engineer shall notify the Contractor in writing stating the Engineer's reasons.
      b. The Contractor shall complete the Work and send a second written notice to the Engineer certifying that the Project, or designated portion of the Project, is substantially complete.
      c. The Engineer and Owner will reinspect the Work.

1.4 FINAL INSPECTION

A. Contractor Certification: Prior to final inspection, the Contractor shall submit written certification that:
   1. The Contract Documents have been reviewed.
   2. The Project has been inspected in compliance with the Contract Documents.
   3. Work has been completed in accordance with the Contract Documents.
   4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
   5. The Project is complete and ready for final inspection.

B. Engineer's Inspection: The Engineer will make final inspection:
   1. Within 10 days after receipt of certification.
   2. Together with the Owner and Contractor.

C. Engineer's Determination of Final Completion:
   1. Should the Engineer consider the Work complete and ready for final payment in accordance with the requirements of the Contract Documents, the Engineer shall request the Contractor to make Project closeout submittals.
   2. Should the Engineer consider the Work not complete and ready for final payment:
      a. The Engineer shall notify the Contractor in writing stating the reasons.
      b. Contractor:
         1) Take immediate steps to remedy the stated deficiencies.
         2) Send a second written notice to the Engineer certifying that the Work is complete.
      c. The Engineer and Owner will reinspect the Work.

1.5 CLOSEOUT SUBMITTALS

A. Contractor:
   1. Provide closeout submittals as required in the Contract Documents.
   2. These submittals shall include, but not necessarily be limited to:
      a. Project record documents.
      b. Operation and maintenance manuals.
      c. Guarantees.
      d. Directory of suppliers for all products used by contractor on Project.
      e. Spare parts and maintenance materials furnished in original box or cardboard box labeled with contents and quantity marked on top and one end of box.
      f. Instruction in operation of all systems.
   3. Record Drawings shall include, but not necessarily be limited to:
      a. Copies of the Drawings incorporating all changes and bulletins (enclosed in clouds).
      b. All shop drawings incorporating all changes (enclosed in clouds).
      c. All approved submittals.
      d. Location and size of all concrete patches and cracks.
      e. Field changes of dimension and detail.
      f. Details not on original Contract Drawings.

1.6 GUARANTEES

A. The act of the Contractor in executing the Agreement for this Work shall be considered as his acceptance of the following guarantee covering the Project:
   1. Any materials, workmanship or equipment furnished as a part of this Project which prove defective or fail to operate properly, within 1 year, or as otherwise specified in the Contract Documents, of the date of acceptance of the Work required under this (or substantial completion of the) Project (damage by wear and tear, violence or casualty not the fault of the Contractor excepted), shall be repaired and replaced by the Contractor promptly upon notification from the Owner and without cost to the Owner.
   2. This guarantee provision shall apply regardless of whether or not such defective workmanship, materials or equipment are listed in the final punch list. Date of acceptance (or substantial completion) will be established by the Owner and Engineer upon finding all items of this Project substantially complete as to quality of workmanship and materials. Also see Division 7 for additional guarantees.
   3. Contractor shall provide warranty commencing on the date of Project acceptance. Completion of various Project phases shall not initiate commencement of warranty in these specific areas. A single Project warranty date, at Project acceptance, will constitute commencement of warranty.
   4. Some areas of Project may be open to vehicular traffic and subject to wear (i.e. coatings, sealants, expansion joints) prior to commencement of warranty.

1.7 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS

A. Affidavits:
   1. Submit with final Application for Payment an affidavit of payment of debts and release of claims using AIA Document G706.
   2. Affidavit shall include:
      a. The Contractor's release or waiver of lien using AIA Document G706A.
      b. Consent of surety of final payment using AIA Document G707.
      c. Separate releases or waivers of liens for Subcontractors, Suppliers, and others with lien rights against property of the Owner together with a list of those parties.

B. Execution: All submittals shall be duly executed before delivery to the Engineer.

1.8 FINAL ADJUSTMENT OF ACCOUNTS

A. Final Statement: Submit a final statement of accounting, which reflects all adjustments, to the Engineer. This statement shall contain the following:
   1. Original Contract Sum.
   2. Additions and deductions.
   3. Total Contract Sum as adjusted.
   4. Previous payments.
   5. Sum remaining due.

B. Final Change Order: The Engineer will prepare a final Change Order reflecting approved adjustments to the Contract Sum not previously made by Change Orders.

1.9 FINAL APPLICATION FOR PAYMENT

A. The Contractor shall submit a final Application for Payment in accordance with the requirements of the Contract Documents.

B. Disposition of Final Application for Payment:
   1. If the final Application for Payment and the Work are acceptable in accordance with the Contract Documents:
      a. The Engineer will, within 10 days after receipt of the Application for Payment:
         1) Submit to the Owner a written recommendation for payment.
         2) Submit to the Owner and Contractor a written notice that the Work is acceptable subject to the provisions of the General Conditions.
      b. The Owner will, within 30 days after receipt of the Application for Payment and the Engineer's recommendation in accordance with the Contract Documents, pay to the Contractor the amount recommended.
   2. If the Application for Payment, the Work or both are unacceptable:
      a. The Engineer will return the Application for Payment to the Contractor, indicating in writing the reasons for refusing to recommend final payment.
      b. The Contractor shall make the necessary corrections and resubmit the Application for Payment.
   3. Final Completion Delayed:
      a. Upon receipt of the Contractor’s final Application for Payment and recommendation by the Engineer, the Owner shall make payment of the balance due for that portion of the Work fully completed and accepted if the Engineer confirms that final completion of the Work is significantly delayed through no fault of the Contractor.
      b. Payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 77 00

SECTION 02 41 23 – SELECTIVE CONCRETE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes furnishing labor, materials, equipment, and supervision to demolish, haul, and dispose of concrete. Concrete delaminations shall be demolished according to the depth indicated on the Drawings.

1.3 SUBMITTALS

A. Product Data: Submit types of equipment proposed for use.

B. Quality Assurance/Control Submittals: Submit restoration and sequencing plan prior to beginning Work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 PREPARATION

A. Review the types of equipment proposed for use with the Owner and Engineer.

B. Conduct demolition operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

C. Protect Owner's property which is to remain including facades, signs, windows, doors, plantings, parking equipment, electrical and mechanical lines and fixtures.

D. Protect adjoining properties, public thoroughfares, sidewalks and utilities from damage due to this operation.

E. Take adequate precautions and provide protection as required to prevent damage to remaining existing elements of the parking structure, adjoining building elements, and vehicles using the facility.

F. At no cost to the Owner, promptly repair damage to adjacent facilities resulting from demolition operations.

G. Clean adjacent facilities of dust, dirt and debris resulting from demolition operations.

H. Authority for performing necessary work on public and private property adjoining Owner's property shall be obtained by the Contractor.

I. Remove temporary protection and devices when no longer needed and when directed by the Owner.

3.2 DELAMINATED CONCRETE SURFACE PREPARATION

A. Location and Marking of Work Areas:
   1. Locate floor slab delaminations by sounding the surface with a hammer or rod, or dragging a chain. Sound all floor slabs. Further sound delaminated areas once located to define their limits. Mark these limits or "boundaries" with chalk or paint.
   2. Locate beam, wall, column and slab delaminations by sounding the appropriate member with a hammer or rod. Cracks, usually horizontal in orientation along beam faces and vertical in orientation near corners of columns, are reliable indicators of delaminated concrete. Further sound delaminated areas once located to define their limits. Mark these limits or "boundaries" with chalk or paint.
   3. Prior to concrete removal locate reinforcing bars and electrical conduits in the vicinity of the repairs. Take the necessary precautions to prevent damage to reinforcement and conduits.

B. Concrete Removal and Surface Preparation:
   1. Remove concrete from within the marked boundary to a minimum depth as indicated on the Drawings using 15 to 30 pound chipping hammers equipped with chisel point bits. Larger chipping hammers with a maximum stroke of 4 inches shall not be used without approval from the Engineer. If delaminations exist beyond the minimum removal depth, then chipping shall continue until unsound and delaminated concrete has been removed from the cavity.
   2. Where reinforcing bars are exposed by concrete removal, exercise extra caution to avoid damaging them during removal of additional unsound concrete. The minimum depth of concrete removal around and beyond the perimeter of the bar for the entire exposed length shall be as indicated on the Drawings.
   3. If rust is present on reinforcing bars where they enter sound concrete, then additional removal of concrete along the reinforcement is required. Such additional removal shall continue until grey reinforcement is exposed. If rust persists beyond the removal limits, advise the Engineer and Engineer will direct further removals.
   4. Sawcut delaminated, spalled and unsound concrete at their marked boundaries to a depth as indicated on the Drawings. Edges shall be straight and patch areas polygon shaped. A diamond blade saw or grinder with abrasive disk suitable for cutting concrete is acceptable for performing this work. Dress the edges cut at the delamination boundary perpendicular to the member face. It shall also be of uniform depth for the entire length of the cut.

C. Preparation of Concrete Bonding Surface: Abrasive blast or high-pressure waterblast exposed concrete surfaces to remove laitance and foreign material that may impair bonding prior to concrete placement.

D. Cleaning and Securing of Reinforcing: Refer to Division 03 Section “Rehabilitation of Concrete”. Clean existing reinforcing and miscellaneous metals of rust and laitance to near white metal.

E. Final Preparation: Air blasting is required as a final step to remove dust and debris.

3.3 STAIN REMOVAL

A. Clean existing beams, columns, walls, and ceilings which have been stained by previous leaking or leaching should be cleaned through abrasive blasting, water blasting, grinding, or other mechanical means. Remove evidence of previous leaking and leaching is to be removed.

3.4 INSPECTION

A. Examine areas and conditions under which the Work is to occur. Notify the Engineer immediately in writing as required in the General Conditions of any conditions detrimental to the proper and timely completion of this Work.

3.5 FIELD QUALITY CONTROL

A. After demolition is complete but prior to final cleaning, the cavities and all exposed reinforcement shall be reviewed by the Engineer. The review will include sounding the exposed concrete to determine completeness of delamination removals, examination of dressed edges to verify depth and vertical edge of cut, and uniformity of excavation to ensure compliance with minimum limits specified.

B. The Engineer will review reinforcement exposed within the cavities for corrosion or damage resulting from Contractor's removal operations. Perform replacement of defective or damaged reinforcement bars in accordance with Division 03 Section “Epoxy-Coated Reinforcing Steel.”

C. Promptly make changes and additions required by Manufacturer's engineer.

D. Submit Manufacturer's engineer's written approval of installation.

3.6 CLEANING

A. Clean materials installed under this Section according to Division 01 Section “Cleaning and Waste Management.”

B. Remove and properly dispose of concrete and debris from areas exposed to public view on a daily basis.

END OF SECTION 02 41 23

SECTION 03 01 33 – REHABILITATION OF CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Locate and remove delaminated, spalled and unsound concrete.
   2. Preparation of cavities created by removal to receive patching materials.
   3. Replacement of existing deteriorated concrete and reinforcement.
   4. Crack repair.

B. Basis of Contract Payments:
   1. Final contract price (lump sum) shall be adjusted by actual quantities installed at unit prices stated in Contractor's Bid for the following:
      a. Existing ceiling, column, and wall repairs.
   2. Refer to Division 00 Section "Bid Forms."
   3. Measure patching quantities on a square foot basis; estimated depth of patch is indicated on the Drawings.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM:
      a. A185 – Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
      b. A615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
      c. C33 – Concrete Aggregates.
      d. C94 – Ready-Mixed Concrete.
      e. C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
      f. C136 – Sieve Analysis of Fine and Coarse Aggregates.
      g. C150 – Portland Cement.
      h. C260 – Air-Entraining Admixtures for Concrete.
      i. C309 – Liquid Membrane Forming Compounds for Curing Concrete.
      j. C494 – Chemical Admixtures for Concrete.
   2. ACI:
      a. 301 – Specifications for Structural Concrete for Buildings.
      b. 302 – Guide for Concrete Floor and Slab Construction.
      c. 390R – Guide to Consolidation of Concrete.
      d. 347R – Guide to Formwork for Concrete.
      e. 440.2R-02 – Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures.
      f. 503.2 – Standard Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive.
      g. 503R – Pull Off Test to Determine CFRP Adhesive to Concrete Substrate.
      h. 546.1 – Guide for Repair of Concrete Bridge Superstructures.
   3. International Concrete Repair Institute (ICRI).
      a. ICRI Concrete Repair terminology
      b. ICRI Technical Guideline No. 320.2R “Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces”.
      c. ICRI Technical Guideline No. 320.1R “Guide for Surface Preparation for the Repair of Deteriorated Concrete from Reinforcing Steel Corrosion”.

1.4 DEFINITIONS

A. Delaminations: Fracture planes or “internal cracks,” within concrete. Typically these fractures are parallel to the member face and vary in depth.

B. Spalls: Potholes, cavities or voids in floor slabs, beams, columns, and walls. Usually result of delamination migrating to face of concrete member. When fracture finally reaches surface, concrete encompassed by delamination breaks away, resulting in spall.

C. Unsound Concrete: Concrete exhibiting one or more of the following:
1. Incipient fractures present beneath existing delaminated or spalled surfaces.
2. Honeycombing.
3. Friable or punky areas.
4. Deterioration from freeze-thaw action.

D. Scaling: Deterioration which attacks mortar fraction (paste) of concrete mix. First appears as minor flaking and disintegration of concrete surface. Scaling eventually progresses deeper into concrete, exposing aggregate which breaks away. Concrete scaling is caused by freeze-thaw action. If concrete is frozen in saturated state, excess water freezing in concrete causes high internal stresses.

E. Saturated Surface Dry (SSD): The condition where the concrete is saturated with water and cannot absorb more, but no free water is present on the surface and is in accordance with the ICRI recommendations.

1.5 SUBMITTALS

A. Submit for record the Manufacturer’s Spec Data Sheets and Health and Safety Data Sheets.

B. Submit for record upon request, a written description of the Contractor’s concrete repair ability, including equipment, facilities, personnel, and a list of similar completed projects.

1.6 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
1. Trained and experienced in the fabrication and installation of the materials and equipment.
2. Knowledgeable of the design and the reviewed Shop Drawings.
3. Each component of a system or product shall be installed by Manufacturer trained personnel. Installers shall demonstrate knowledge of product and installation.

B. Formwork: Design of the formwork is the responsibility of the Contractor. Proposed method of forming shall be submitted to Engineer for review prior to placement of concrete. Submitted method shall include materials and means of bracing and sealing formwork. Design shall provide adequate means of ensuring complete filling of forms with concrete through the use of bird mouths or other methods. Refer to ACI 347R for assistance with design of formwork.

C. The patched areas shall be sounded with a hammer 7 days after placement. Repair all detected hollowness by removing and replacing the patched or affected area at no extra cost to the Owner.

D. If shrinkage cracks appear in the repair material within 72 hours after placement, the repairs shall be considered defective, and shall be removed and replaced at no extra cost to the Owner.

E. Plan drawings shall be maintained locating all repairs performed under this section. Location and size of patches, overlays, etc. must be located on clean drawings. Separate drawings shall be maintained for each level. These drawings shall be incorporated into record set required in accordance with Division 01.

F. The Contractor, or Restoration Subcontractors, shall have not less than 2 years’ experience in the field of structural concrete restoration work.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Cold weather concreting: In accordance with ACI 306.1 or as specified herein.

B. Hot weather concreting: In accordance with ACI 305 or as specified herein.

C. Inclement Weather:
   1. Unless adequate protection is provided, concrete shall not be placed during rain, sleet or snow.
   2. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish.

1.8 DELIVERY, STORAGE AND HANDLING

A. Store materials on platforms off ground, protected from the elements.

B. Handle and store aggregates in a manner to prevent intrusion of foreign material. Protect all material until used.

C. Material which has deteriorated or which has been damaged shall not be used.

1.9 WARRANTY

A. All material under this section shall be fully warranted for a period of 1 year against any defects in materials or workmanship commencing with the date of Substantial Completion.

B. All required warranties shall be obtained by the Contractor as an agent for the Owner from all installation contractors, and the manufacturers. All such warranties shall inure to the benefit of the Owner without the necessity of separate transfer or assignment thereof.

C. Responsibilities of Each Party:
   1. Contractor: Shall act as the agent for the Owner in collecting and enforcing submission of the warranty requirements prior to Substantial Completion of the project.
   2. Installation Contractor: Responsible for 100% of the labor to remove and replace the defective material if a failure occurs within the warranty period.
   3. Manufacturer: Responsible for supplying 100% of replacement material in case of a failure during the warranty period unless stated otherwise in the warranty.
   4. The installation contractor and material supplier specifically agree that the warranty is a joint and several type of warranty where, in case of default of either party, the other party is then responsible for 100% of all the work in accordance with the original contract documents. The warranty form shall be jointly signed by authorized representatives from both the installation contractor and the manufacturer.

D. Specific Warranty Requirements
   1. The 1-year comprehensive warranty shall specifically cover the following:
      a. A fully complete 100% warranty for all workmanship and material for the repairs.
      b. Delamination of the coating or substrate.
      c. Any damage to material or equipment caused by coating system failure.
      d. Ordinary wear and tear.
      e. Failures due to improper surface preparation, use of non-approved materials, insufficient thickness for any part of the system including primer(s), faulty workmanship, or non-approved deviations from current manufacturer’s specifications and written instructions.
      f. Material incompatibility with any existing coating.

E. Replacement Cost:
   1. The warranty shall cover 100% of the replacement cost whether or not the Owner has benefitted from use of the product through part of its useful life.
   2. When the work covered by the warranty has failed, the replacement work shall be warranted to cover the original remaining warranty period.

PART 2 - PRODUCTS

2.1 MATERIALS

A. VOC Compliance:
1. All individual coatings and coating systems shall have VOC levels at or below the EPA recommendations identified in 40 CFR Part 59.
2. VOC content shall be tested in accordance with EPA Method 24.

B. Vertical and Overhead Trowelable Concrete Repairs:
1. MasterEmaco S 488CI, BASF, Shakopee, MN.
2. Sikatop 122 Plus or 123 Plus, Sika Corp., Lyndhurst, NJ.
3. Planitop 23, or X, Mapei, Deerfield Beach, FL.
4. Or approved equivalent.

C. Vertical and Overhead Form and Pour Concrete Repairs:
1. MasterEmaco S 466CI or S 477CI, BASF, Shakopee, MN.
2. Sikatop 111 Plus or Sikacrete 211 SCC Plus, Sika Corp., Lyndhurst, NJ.
3. Planitop 15 or FD, Mapei, Deerfield Beach, FL.
4. Or approved equivalent.

D. Horizontal Concrete Repairs:
1. Sikatop 111 Plus or Sikacrete 211 SCC Plus, Sika Corp., Lyndhurst, NJ.
2. MasterEmaco S 466CI or S 477CI, BASF, Shakopee, MN.
3. Planitiop 15 or FD, Mapei, Deerfield Beach, FL.
4. Or approved equivalent.

E. Crack Repair Rout and Seal: Refer to Division 07 Section “Joint Sealants for Parking Structures.”

F. Field-Applied Epoxy Modified Coating:
1. Sika Armatec 110 Epo Cem by Sika.
2. MasterEmaco P 124 by BASF.
3. Mapei Mapefer 1k by Mapei.
4. Dural Prep AC by Euclid.

G. Steel Reinforcing: Refer to Division 03 Section “Epoxy-Coated Reinforcing Steel.”

H. Miscellaneous Steel Shapes, Plates, and Bars:
1. W-Shapes: ASTM A 992.
2. Channels, Angles: ASTM A 36.
3. Plates and Bars: ASTM A 36.
4. All materials to be hot-dip galvanized ASTM A 123 after assembly, or stainless steel ASTM A 666, Type 304L as indicated on Drawings.
5. All welds shall be E70XX low-hydrogen electrodes. Stainless steel electrodes to be Type 308L or 347.

I. Adhesive Anchors:
1. HY 200 by Hilti, Inc.
2. PE 1000+ by Powers Fasteners Inc.

J. General: Provide primers as required in accordance with Manufacturer's recommendations.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation: Install products in strict accordance with Manufacturer’s recommendations.

B. Engineer’s Inspection: Do not install patching or reinforcing material until Engineer has inspected the repair site.

C. Shoring:
   1. Temporary shoring may be required at slab, beam, or column repairs.
   2. Shores shall be in place prior to concrete removal and cavity preparation in areas requiring shores.
   3. Provide catch platform if required for removed concrete.
   4. Contractor is responsible for all work relating to construction, erection methods, bracing, shoring, rigging, guys, scaffolding, formwork, and other work aids required to safely perform the Work.

D. Waste Removal: Remove waste material from Site and dispose of legally.

3.2 CONCRETE REPAIRS

A. General:
   1. Before commencing work, examine all adjoining work on which this work is dependent and report in writing to the Engineer any condition which prevents Contractor from performing the work. Starting work constitutes acceptance of adjoining work.
   2. Inspection of Repair Preparation:
      a. Inspection:
         1) After removals are complete, but prior to final cleaning, cavity and exposed reinforcement shall be inspected by Contractor and verified by Engineer for compliance with requirements of this Section.
         2) Where Engineer finds unsatisfactory cavity preparation, Engineer shall direct Contractor to perform additional removals. Engineer shall verify areas after additional removals.
      b. Defects:
         1) Inspect embedded reinforcement and conduits exposed within cavity for defects due to corrosion or damage resulting from removal operations.
         2) Notify Engineer of defective and damaged reinforcement or conduits.
         3) Replace damaged or defective reinforcement or conduits according to this Section and as directed by Engineer.
   3. Provide other surface treatment as required by the Manufacturer of the patching compounds.
   4. Inform Engineer at least 2 days in advance of concrete repair placement to allow adequate time for Engineer to schedule inspection.
   5. Use form and fill method or trowel on fill method as Manufacturer recommends.
   6. Predampen cavity surface with clean water. Cavity concrete surfaces shall be saturated surface dry (SSD) with no free water. Provide 24 continuous hours of poured water on horizontal surface cavities and 24 continuous hours of sprinkler wetting on vertical surface cavities immediately prior to placement of concrete repair material.
   7. For deeper horizontal patches add aggregate in accordance with Manufacturer's recommendations.
   8. Concrete shall be placed continuously at each repair area until reinforcing steel is encapsulated, forms are full and air pockets are eliminated.
   9. Vibrators shall be utilized to assist in consolidating concrete. Concrete shall not be overvibrated. Overvibration of concrete (concrete segregation) shall be cause for rejection of the work. Refer to ACI 309R for assistance with the selection, numbers and use of vibrators.
   10. Protect freshly applied concrete from premature drying and maintain with minimal moisture loss at a relatively constant temperature for a minimum of 7 days.
   11. Use a form release agent that is compatible with specified curing compounds.
   12. Leave forms in place for a minimum of 3 days.
   13. Immediately after removing forms, either wet cure or apply at least 2 coats of curing compound in accordance with Manufacturer's recommendations.
   14. 14 days or later after installation of repairs, sound repair concrete in presence of Engineer. Remove delaminated or otherwise unsound concrete encountered and install new repair concrete.

B. Floor Slabs:
   1. Refer to Drawings for specific repair details.
   2. Delaminations: Locate by sounding surface with hammer, rod, or chain drag.
   3. When delaminated area is struck, distinct hollow sound is heard.
   4. Sound designated floors for delaminations.

C. Vertical and Overhead Surfaces:
   1. Refer to Drawings for specific repair details.
   2. Surface Delaminations: Locate by sounding appropriate member with hammer or rod.
   3. Cracks, usually horizontal in orientation along beam faces, and vertical in orientation near column corners are indicators of delaminated concrete.

D. Crack Repair:
   1. Refer to Drawings for specific criteria for crack repair.
   2. Follow sealant Manufacturer’s specific guidelines where more stringent than those referenced herein.
   3. Cracks which are prepared shall be sealed the same day.
   4. Routing of cracks shall be a dry process.

E. Existing Reinforcement:
   1. Existing reinforcement and miscellaneous metal to remain shall be cleaned of rust and laitance to Near White Metal and field epoxy coated in accordance with epoxy coating Manufacturer's recommendations.
   2. Loose reinforcement bars shall be secured by either tying to bonded reinforcement or drilling supplemental anchors and installing tie downs. Lead anchors are not permitted.
   3. Field-applied epoxy cure time must be extended as directed by Engineer during cold weather application.
   4. Field-applied epoxy must be properly cured in a non "tacky" condition prior to concrete placement.
   5. Remove epoxy spillage from adjacent concrete surfaces.

F. Field-Applied Epoxy Modified Coating:
   1. After abrasive blasting operations and cleanup are completed, paint existing reinforcement and miscellaneous metals embedded in concrete with a field-applied epoxy modified coating with Anti-Corrosion Agent (two coats at 10 mils).
   2. Protect prepared surfaces from damage prior to and during patch placement.

G. Adhesive Anchors:
   1. Provide sizes and types as indicated on Drawings.
   2. All threaded rods and associated hardware to be Type 303/304 stainless steel.
   3. Injection gel to be two-component epoxy ASTM C 881.
   4. Stainless steel screens as indicated on Drawings or as recommended by Manufacturer.
   5. Installation per Manufacturer’s recommendations.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Engineer: Check work.

B. Promptly make corrections, changes, and additions required by Manufacturer's engineer.

3.4 CLEANING

A. Clean materials installed under this Section in accordance with Division 01 Section "Cleaning and Waste Management."

END OF SECTION 03 01 33

SECTION 03 11 00 – CONCRETE FORMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the design, installation and removal of forms for cast-in-place concrete.

B. Division of Work:
   1. In accordance with the General Conditions, Contractor is responsible for dividing the Work among the Subcontractors and Suppliers and for delineating the work to be performed by specific trades. The following are suggestions as to how the Work may be divided. This is not a complete list of all the work:
      a. Mechanical, Electrical and Plumbing Trades: Supply, locate and install premanufactured items including inserts, sleeves, and other embedded items required by those respective trades.
      b. Formwork Subcontractor:
         1) Supply and install Site fabricated box-outs for chases, sleeves and other openings for mechanical, electrical and plumbing trades.
         2) Install other inserts, embedded parts, box-outs for openings, chases, reveals and recesses, except those specifically mentioned above that are by mechanical, electrical or plumbing trades. Special inserts, embedded parts or other special requirements needed by a specific trade shall be supplied by that trade to the formwork Subcontractor for installation.
      c. Contractor: Coordinate location of mechanical, electrical and plumbing inserts, embedded parts, openings and recesses with respective trades.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ACI - American Concrete Institute:
      a. 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
      b. 301 - Standard Specifications for Structural Concrete for Buildings.
      c. 347R - Guide to Formwork for Concrete.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. Form Construction:
   1. Provide required forms, shores, bracing, breast timbers, form ties, and accessories in sufficient quantities so as not to delay the Work, and of strength to support vertical and horizontal loads to which they are subjected.
   2. Formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces, structure, or adjacent materials.
   3. Shoring to be secured against horizontal movement by bracing in both longitudinal and transverse directions.
   4. Provide shoring so loads from construction above will transfer directly. Space shoring in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members where no reinforcing steel is provided.

1.5 SUBMITTALS

A. Certification: Written certification that design of formwork and shoring systems has been performed and sealed by a Professional Engineer registered in Michigan.

B. Shop Drawings: For formwork (including installation instructions) and shoring system (including sequence of shoring and removal). Shop drawings shall be sealed by a Professional Engineer registered in Michigan.

C. Manufacturer's Literature: For form release agent.

D. Manufacturer's Literature: For formwork including facing materials.

1.6 QUALITY ASSURANCE

A. Design: The design and engineering of formwork, as well as its construction, shall be the responsibility of Contractor. Design calculations for formwork and formwork drawings are required.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Formwork Facing Materials:
   1. Smooth Form Finish Areas:
      a. Locations: All locations unless otherwise noted.
      b. The form facing material shall produce a smooth, hard, uniform surface on the concrete.
      c. Form facing materials may be plywood, tempered concrete-form-grade hardboard, metal, plastic, paper; or other approved material capable of producing the desired finish.
      d. Facing materials shall be supported by studs or other backing capable of preventing deflections in excess of those specified herein.
      e. Material with damaged surfaces, worn edges, patches, dents or other defects which will impair the texture of the concrete surface shall not be used.
   2. Rough Form Finish Areas:
      a. Locations: Locations not exposed to view in final conditions.
      b. Construct with plywood, lumber, metal, and other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

B. Void Forms:
   1. Degradable paper or cardboard forms, to suit slab and beam applications.
   2. Strong enough to carry construction live load and the weight of plastic concrete without significant deformation.
   3. Configurations to suit application indicated on the Drawings, as chosen by Contractor.
   4. Sure Void Products, Inc.; or equal.

C. Chamfer Strips:
   1. Wood, metal, rubber, or PVC.
   2. Sizes as indicated, 3/4-inch x 3/4-inch minimum.

D. Form Ties:
   1. At Smooth Form Finish Areas:
      a. Factory fabricated metal ties.
      b. Stainless steel, removable, or snap type, with tapered cones as required to leave no tie portion within 1-inch of concrete surface plane.
      c. Designed to leave no larger than a 7/8-inch diameter hole at concrete surface.
      d. Chosen by Contractor to suit application and to resist pressure of fresh concrete.
      e. For liquid containing or resisting walls, such as tanks, trenches, basement walls and elevator pits, in addition to the above requirements, provide waterstop type feature on the tie.
   2. At Rough Finish Areas: Same requirements as specified for smooth form finish areas, as modified following:
      a. Removable ties with tapered cones. Do not use snap ties.

E. Form Release Agent:
   1. Chemically neutral agent in hydrocarbon solvent that will effectively prevent absorption of moisture and prevent bond with the concrete.
   2. Non-staining and compatible with finish coats specified in Division 09 Section “Restoration Painting.”

PART 3 - EXECUTION

3.1 FORMWORK CONSTRUCTION

A. General:
   1. Install wall form ties in a regular repetitive pattern.
   2. Align and secure joints to avoid offsets.
   3. Provide chamfered strips in exposed corners of concrete stair stringers, piers, columns, beams, spandrels, internal corners and for similar conditions throughout the Work.
   4. Construct forms to allow for installation of waterstops, bentonite waterproof bead, and waterproofing termination.
   5. Tie waterstops up to prevent folding when concrete is placed.
   6. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.
   7. The arrangement of facing material shall be orderly and symmetrical with the number of seams kept to the practical minimum.
   8. Retighten forms after concrete placement if required to eliminate mortar leaks.
   9. Inspection Ports and Cleanouts:
      a. Provide temporary openings where interior area of formwork is inaccessible for cleanout and inspection.
      b. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar.
      c. Locate temporary openings on forms at inconspicuous locations.

B. Openings and Embedded Items:
   1. Set and build into the work anchorage devices and other embedded items required for work that is attached to, or supported by, cast-in-place concrete.
   2. Coordinate work of other Sections and cooperate with trade involved in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchor and other inserts.
   3. Use setting drawings, diagrams, instructions and directions provided by Suppliers of the respective items.
   4. Do not perform work unless specifically indicated on Drawings or reviewed prior to installation.

C. Cleaning:
   1. Clean forms as erection proceeds, to remove foreign matter.
   2. Remove cuttings, shavings and debris from within forms.
   3. Flush with water or use compressed air to remove remaining foreign matter.
   4. Ensure that water and debris drain to exterior through clean-out ports.
   5. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints.
   6. Thoroughly clean embedded waterstops and concrete surfaces prior to constructing forms for the next pour.

D. Applying Form Release Agent:
   1. Temperature of release agent and surfaces to which it is applied shall be a minimum of 70 degrees F.
   2. Apply by spray only.
   3. Uniformly coat surfaces with a thin film.
   4. Wipe off excess with clean towels.
   5. Apply in accordance with Manufacturer's recommendations.
   6. Do not allow to stand in puddles in the forms and prevent bonding of concrete at construction joints.

E. Provisions for Form Removal:
   1. Fabricate forms for easy removal without hammering or prying against the concrete surfaces.
   2. Kerf wood inserts for forming keyways, reglets, recesses and the like to prevent swelling and for easy removal.

3.2 FORM AND SUPPORT REMOVAL

A. Forms and supports shall remain in place for not less than the following periods of time:
   1. Foundations and Columns: 12 to 24 hours.
   2. Sides of Beams and Walls: 12 to 24 hours.

B. In any event, do not remove forms and supports until concrete in walls has reached 30% of design strength, and in structural members and slabs has reached 75% of design strength.

C. Formwork removal strength will be verified by field-cured test cylinders in accordance with ACI 301. Alternatively, formwork removal strength may be determined by the maturity-factor-procedure in accordance with ASTM C1074. Contractor shall employ an independent Testing Laboratory to determine formwork removal strength.

D. Special precautions shall be taken when concrete is placed in average temperatures of 50 degrees F or below to ensure that forms are not removed before design strengths specified above are met.

E. If Contractor elects to use high-early-strength cement, the specified periods of time may be reduced as allowed by Engineer. This does not relieve Contractor of Contractor's liability.

F. Remove forms in such a manner and at such times as required to ensure safety of persons involved and so as to protect and maintain structural integrity of members.

G. Particular care shall be taken in removing forms to minimize damage to concrete surfaces; use crush or wrecking plates as necessary.

H. Whenever the formwork is removed, cure the exposed concrete as specified under Division 03 Section “Cast-In-Place Concrete for Parking Structures.”

3.3 FIELD QUALITY CONTROL

A. Inspect and check completed formwork, shoring and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties and parts are secure.

B. Form Surface Repairs:
   1. Repair surfaces of forms to be reused in the work.
   2. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable.
   3. Apply new form release agent to new concrete contact form surfaces.
   4. Do not use patched forms for exposed concrete surfaces.

C. Special Inspections:
   1. Inform Engineer when formwork is complete and has been cleaned, to allow for inspection.
   2. Allow inspection of each section of plywood type of formwork prior to reuse.
   3. Obtain inspections prior to placing concrete.

END OF SECTION 03 11 00

SECTION 03 15 16 – POST-INSTALLED ANCHORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of post-installed anchors.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following pertinent provisions:
   1. ASTM:
      a. A36 - Carbon Structural Steel.
      b. A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.
      c. A198 - Steel Bolting Materials for High-Temperature Service.
      d. A240 - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
      e. A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
      f. A510 - General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.
      g. A563 - Carbon and Alloy Steel Nuts.
      h. B633 - Electrodeposited Coatings of Zinc on Iron and Steel.
      i. E488 - Strength of Anchors in Concrete and Masonry Elements.
      j. E1512 - Testing Bond Performance of Bonded Anchors.
      k. F436 - Hardened Steel Washers.
      l. F593 - Stainless Steel Bolts, Hex Cap Screws, and Studs.
      m. F594 - Stainless Steel Nuts.
      n. F844 - Washers, Steel, Plain (Flat), Unhardened for General Use.
   2. ACI:
      a. 318, Chapter 17 - Anchoring to Concrete.
      b. 355.2 - Qualification of Post-Installed Mechanical Anchors in Concrete.
      c. 355.4 - Qualification of Post-Installed Adhesive Anchors in Concrete.
   3. International Code Congress Evaluation Service - ICC-ES:
      a. AC-193 - Mechanical Anchors in Concrete Elements.
      b. AC-308 - Post-installed Adhesive Anchors in Concrete Elements.
   4. Michigan Building Code.

1.4 SUBMITTALS

A. Product Data: For each anchor type to be furnished for each base material to which it will be fastened, including:
   1. Anchor specific type, physical properties and installation procedures.
      a. General catalog sheets of anchors without specific reference are not acceptable.
   2. Strength developed by anchor in each base material to which each is being fastened.
   3. Anchor embedment depth in base material.
   4. Anchor material.
   5. ICC-ES Report for each specific anchor indicating compliance to applicable building code.

1.5 QUALITY ASSURANCE

A. Provide special inspections of post-installed anchors in accordance with Division 01 Section “Testing Laboratory.”

B. Compliance:
   1. Mechanical anchors shall comply with AC-193 and ACI 355.2.
   2. Adhesive anchors shall comply with AC-308 and ACI 355.4.

C. Installation Personnel Qualifications:
   1. Knowledgeable of the specific Manufacturer's requirements for proper installation of post-installed anchors.
   2. Anchor installers shall be properly trained by the anchor Manufacturer on Site.
      a. Anchor Manufacturer's representative shall not be a distributor or third party.
      b. The installers to be trained shall be the actual person or persons installing the anchors, not the foreman, superintendent or similar supervisory personnel.
      c. The on Site training shall include training for installation of each anchor in each substrate on the Project for each trade.
      d. Each person installing the anchor shall be trained.
      e. Anchor installation training shall take place prior to the installation of the anchors. The installer shall have training verification available for review at any time.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Hilti.

B. Products of the following manufacturers are among those which may be considered equal based on Submittals reviewed by Engineer; approval or rejection of the proposed or equal will be at Engineer's sole discretion:
   1. Powers/Rawl.
   2. Redhead.
   3. Simpson.

C. If Contractor intends to substitute other than Basis of Design products, Contractor shall be responsible to submit substitution product data that proves equivalence including, but not limited to:
   1. Capacities for specific anchor sizes, embedment lengths, and base materials into which the anchor will be fastened.
   2. Capacity reduction factors for spacing and edge distance.
   3. Material of each anchor type.
   4. ICC ES report applicable to each anchor type.

2.2 MATERIALS

A. Actual or Potential Ambient Conditions:
   1. Submerged or Corrosive Environment: Stainless steel in accordance with ASTM F593.
   2. Dry Areas: Mild steel, galvanized in accordance with ASTM B633, SC1, Type III.

2.3 POST-INSTALLED ANCHORS

A. Anchors that Resist Loads Through Mechanical Friction or Keying Forces:
   1. Expansion Anchors Approved for Use in Cracked Concrete:
      a. Wedge style anchor.
      b. Hilti Kwik Bolt TZ2 (ICC-ESR 4266).
      c. Capable of sustaining an ultimate load of 4 times the imposed load capacity in concrete when tested in accordance with ASTM E488.
   2. Expansion Anchors Approved for Use in Uncracked Concrete:
      a. Wedge style anchor.
      b. Hilti Kwik Bolt TZ2 (ICC-ESR 42660.
      c. Capable of sustaining an ultimate load of 4 times the imposed load capacity in concrete when tested in accordance with ASTM E488.

3. Sleeve Anchors Approved for Use in Cracked and Uncracked Concrete:
   a. Expanding sleeve style anchor.
   b. Hilti HSL-3 (ICC-ESR 1545).
   c. Hex, acorn, round or flat head anchor or threaded anchor with hex nut as situation requires or as indicated on the Drawings.
4. Undercut Anchors Approved for Use in Cracked and Uncracked Concrete:
   a. Expanding sleeve, self-undercutting wedge style anchor.
   b. Hilti HDA (ICC-ESR 1546).
   c. Hex or flat head anchor or threaded anchor with hex nut as situation requires or as indicated on the Drawings.
5. Screw Style Anchors Approved for Use in Cracked Concrete:
   a. Hilti Kwik HUS EZ (ICC-ESR 3027).
   b. Capable of sustaining an ultimate load of 4 times the imposed load capacity in concrete when tested in accordance with ASTM E488.
6. Expansion Anchors Approved for Use in Solid Grouted Masonry:
   a. Wedge style anchor.
   b. Hilti Kwik Bolt TZ2 (ICC-ESR 4561).
7. Screw Style Anchors Approved for Use in Solid Grouted Masonry:
   a. Hilti Kwik HUS EZ (ICC-ESR 3056).

B. Anchors that Resist Loads Through an Injectable Chemical Adhesive:
1. In Concrete: Hilti HIT HY 200 Safe Set.
2. In Solid Grouted Masonry: Hilti HIT-HY 270.
3. In Hollow Brick or Hollow Masonry: Hilti HIT-HY 270 with screen tubes.
4. Anchored Material: Carbon steel or stainless steel threaded rods or deformed reinforcing bars as specified herein or as indicated on the Drawings.
5. Bonding Strength: Tested in accordance with ASTM E1512.
6. If installation temperatures of base materials fall below 41 degrees F, review cold weather applications with Manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Pre-Construction Conference:
1. At least 15 days prior to the installation of post-installed anchors, conduct a pre-installation conference at the Site.
   a. Repeat pre-installation conference as many times as is necessary to address all installers using post-installed anchors on the Project.
2. Contractor shall be responsible for arranging the conference and agenda.
3. Agenda shall include, but not be limited to:
   a. Reviewed and approved post-installed anchors for use in the Project.
   b. Anchor installation training (to be performed by Manufacturer’s representative).
   c. Drilling requirements and restrictions for the anchors.
   d. Special inspection requirements.

3.2 INSTALLATION

A. Install post-installed anchors:
1. In strict accordance with the installation instructions supplied by the Manufacturer.
2. In rotary hammer drilled holes, unless otherwise approved by Engineer.
3. In drilled out holes of the proper depth and diameter cleaned of dust and debris according to the Manufacturer’s specific installation instructions.

B. Provide sizes, spacings, edge distances and embedment as indicated on the Drawings.

C. Anchors that Resist Loads Through an Injectable Chemical Adhesive:
   1. Install in concrete with minimum age of 21 days, and in masonry with a minimum age of 7 days.
   2. Do not apply load until adhesive has properly cured and developed specified strength where cure time shall be as called out in the Manufacturer's literature based on prevailing environmental conditions at the time of installation.

3.3 CLEANING

A. Clean materials installed under this Section according to Division 01 Section "Cleaning and Waste Management."

END OF SECTION 03 15 16

SECTION 03 21 16 – EPOXY-COATED REINFORCING STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and placement of epoxy coated concrete reinforcement.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ACI:
      a. 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
      b. 315 - Details and Detailing of Concrete Reinforcement.
      c. 315R - Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
      d. 318 - Building Code Requirements for Reinforced Concrete.
   2. ASTM Specifications:
      a. A185 - Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
      b. A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
      c. A775 - Epoxy-Coated Reinforcing Steel Bars.
   3. AWS: D1.4 - Structural Welding Code-Reinforcing Steel.
   4. CRSI:
      a. Manual of Standard Practice.
      b. Reinforcing Bar Detailing.
      c. Placing Reinforcing Bars.

1.4 SUBMITTALS

A. Manufacturer's Literature: For epoxy coating.
   1. Manufacturer's product data.
   2. Verification that the product has been tested and approved in accordance with ASTM A775.

1.5 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of ASTM D 3963/D 3963M-96 Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars and CRSI Field Handling Techniques for Epoxy-Coated Rebar at the Job Site.

B. Deliver reinforcement free of loose rust, scale, paint, oil coating damage and structural defects.

C. Storage:
   1. Store coated reinforcement on Site so as to prevent damage to reinforcement and to epoxy coating.
   2. Store coated reinforcement on padded or wooden cribbing off the ground. Protect from weather.
   3. If reinforcement is to be stored on Site for more than 1 month before placement, cover reinforcement with opaque polyethylene sheeting, properly secured. Do not store reinforcement at job site unprotected over winter.

D. Handling:
   1. Contact areas of handling and hoisting systems shall be padded or be made of nylon or other acceptable material.
   2. Use multiple pick-up points to lift bundles of coated steel to prevent bar to bar abrasion due to bundle sag.
   3. Pad bundling bands or fabricate bands of nylon or other acceptable material.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
1. All concrete reinforcement and accessories shall be new, free from rust, scale, paint, oil and structural defects immediately before application of epoxy coating.
2. Reinforcement shall be the sizes indicated on the Drawings.

B. Epoxy Coating Material:
1. Corrosion Protection Coatings:
a. One part, heat curable, thermosetting powdered epoxy.
b. Conforming with ASTM A775.
2. Epoxy Coating Patching Material:
a. Compatible with factory applied epoxy coating.
b. Conforming with ASTM A775.

C. Reinforcing Bars:
1. ASTM A615.
2. Yield Stress: Fy = 60,000 psi.
3. Deformed unless noted otherwise; smooth where specifically indicated on the Drawings.

D. Welded Wire Fabric:
1. ASTM A185.
2. Yield Stress: Fy = 65,000 psi.
3. Plain, cold drawn, electrically welded fabric.

E. Accessories:
1. Chairs, bolsters, anchors, spacers, stirrups, ties and other devices as required for spacing and fastening reinforcement in place shall conform to CRSI Manual of Standard Practice.
2. Supports for epoxy coated reinforcement shall be epoxy coated or shall be made of a dielectric material.
3. At exposed underside of concrete, use plastic-tipped chairs and bolsters.
4. Fasten coated reinforcing with plastic -, nylon -, or epoxy-coated steel tie wire.

2.2 FABRICATION

A. General:
1. Fabricate reinforcement to the dimensions indicated on the Drawings in accordance with the CRSI Manual of Standard Practice.
2. Tolerances: As indicated in ACI 117.
3. Bundle and tag reinforcement with suitable identification to permit checking, sorting and placing.
4. Welding:
a. Not permitted unless specifically indicated on the Drawings.
b. When permitted, comply with AWS D1.4.
c. No tack welding permitted.

B. Hooks:
1. Bend hooks in accordance with ACI 318.
2. Cold bend bars in such a way that will not damage the reinforcement.

C. Epoxy Coating:
1. Minimum 6 mils thick and uniform.
2. Coat reinforcement after fabrication.
3. Repair damage to epoxy coating in accordance with:
a. ASTM A775.
b. Epoxy-coating Manufacturer's recommendations.

PART 3 - EXECUTION

3.1 PLACEMENT

A. Place epoxy-coated reinforcement in accordance with:
   1. Drawings.
   2. CRSI Placing Reinforcing Bars and Manual of Standard Practice.
   3. Tolerances indicated in ACI A117.

B. Clearance:
   1. Preserve clear space between bars of not less than 1 times the normal diameter of round bars.
   2. In no case let the clear distance be less than 1-inch or less than 1-1/3 times the maximum size of aggregate.
   3. In the absence of specific cover requirements on the Drawings, provide the following minimum concrete cover for reinforcement:
      a. Cast against and permanently exposed to earth: 3 inches.
      b. Exposed to Earth, Weather or Water:
         1) No. 6 Through No. 18 Bars: 2 inches.
         2) No. 5 Bars, 5/8-Inch Wire and Smaller: 1-1/2 inches.

C. Splices:
   1. Comply with ACI 318 and this Section.
   2. In the absence of specific lap requirements on the Drawings, lap in accordance with ACI 318, Class B.
   3. Laps of Circular Ring Tension Steel: Not less than 40 bar diameters.

D. Corner Bars:
   1. Provide corner bars for all horizontal wall steel.
   2. In the absence of specific lap requirements on the Drawings, lap in accordance with ACI 318, Class B.

E. Field Cutting and Bending: Field cutting or bending of bars will be permitted only under special conditions approved by Engineer.

F. Field Welding:
   1. In accordance with AWS D1.4.
   2. Only when specifically indicated on the Drawings.
   3. Performed with adequate ventilation.
   4. No tack welding permitted.

G. Welded Wire Fabric:
   1. Block up, lap, and tie all welded wire fabric reinforcement.
   2. Lap welded steel fabric 1 mesh at sides and ends.
   3. Install welded wire 1-inch from top of slab.

H. Bar Supports:
   1. Rest epoxy-coated steel reinforcement supported from formwork on coated wire bar supports, or on bar supports made of dielectric material or other suitable material.
   2. Coat wire bar supports with dielectric material for a minimum distance of 2 inches from the point of contact with the coated steel member.
   3. Reinforcing Bars Used as Support Bars: Epoxy coated.

I. Slabs On Grades:
   1. Do not hook up welded wire fabric; either tie on supports at correct elevations, or lay on partial slab thickness of fresh concrete just prior to placing remainder of slab.
   2. For chairs or bolsters resting on soil, place on either:
      a. Sand plates.
      b. Concrete bricks set flush with soil to provide bearing surface for chairs or bolsters.

3.2 FIELD QUALITY CONTROL

A. Notification:
   1. Notify Engineer when reinforcing is in place so Engineer may review the reinforcement placement.
   2. Provide a minimum of 48 hours' notice prior to placement of concrete.

B. Repair:
   1. Repair areas of damage resulting from fabrication, handling, cutting or welding in accordance with:
      a. Coating Manufacturer's recommendations.
      b. ASTM A775.
   2. Provide proper ventilation during patching operations.
   3. If in opinion of Engineer cross-sectional area loss of bars is greater than 15%, Contractor shall splice as directed by Engineer. Minimal splice lap shall be as indicated on Drawings.

END OF SECTION 03 21 16

SECTION 03 31 26 – CAST-IN-PLACE CONCRETE FOR PARKING STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Equipment, materials, labor, and supervision to install cast-in-place concrete as indicated on Drawings and as specified herein.
   2. Remove and reinstall new electrical conduit, mechanical conductors, light fixtures, mechanical equipment, signs, etc. necessary for proper completion of repairs.
   3. Concrete repair materials.

B. Basis of Contract Payments:
   1. Final contract price (lump sum) shall be adjusted by actual quantities installed at unit prices stated in Contractor's Bid for the following:
      a. Existing ceiling, column, and wall repairs.
   2. Refer to Division 00 Section "Bid Forms. "
   3. Measure patching quantities on a square foot basis; estimated depth of patch is indicated on the Drawings.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. Reference Standards and Cited Publication. (ACI 301 1.3).
   2. AASHTO:
      a. T 260 - Method of Sampling and Testing for Total Chloride Ion in Concrete and Concrete Raw Materials.
      b. T 318 - Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.
   3. ACI:
      a. 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
      b. 201.2R - Guide to Durable Concrete.
      c. 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
      d. 212.4R - Guide for the Use of High-Range Water Reducing Admixtures (Superplasticizers) in Concrete.
      e. 221.R - State-of-the-Art Report on Alkali – Aggregate Reactivity
      f. 222R - Corrosion of Metals in Concrete.
      g. 301 - Specifications for Structural Concrete.
      h. 302.1R - Guide for Concrete Floor and Slab Construction.
      i. 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
      j. 305R - Hot Weather Concreting.
      k. 306R - Cold Weather Concreting.
      l. 308 - Standard Practice for Curing Concrete.
      m. 311.5R - Guide for Concrete Plant Inspection and Field Testing of Ready-Mixed Concrete.
      n. 318 - Building Code Requirements for Structural Concrete.
      o. 362.1R - Guide for the Design of Durable Parking Structures.
      p. 515.1R - Guide to the Use of Waterproofing, Dampproofing, Protective and Decorative Barrier Systems for Concrete.
      q. ACI Concrete Craftsman Series.
      r. CP-10 - Craftsman Workbook for ACI Certification of Concrete Flatwork Technician Finisher.
      s. SP-15, Field Reference Manual.
      t. SP 66 - Detailing Manual.

4. Federal Highway Administration: FHWA-RD-77-85 - Sampling and Testing for Chloride Ion in Concrete.
5. ASTM: As specified herein.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. Design and Performance Requirements:
   1. Comply with ACI 301 4.2.2 and as follows.
   2. Coarse Aggregate (ACI 301 4.2.2.3):
      a. Maximum Aggregate Size and ASTM C33 Gradation Requirements (4.2.2.3):
         1) Footings and Piers: 1-inch, size 57.
         2) Other Members: 3/4-inch, size 67.
   3. Air Content (ACI 301 4.2.2.4):
      a. As indicated on Drawings.
      b. Perform plastic air test by pressure method, ASTM C231 or volumetric method, ASTM C173. Verify air content with unit weight test.
   4. Admixtures (ACI 301 4.2.2.5):
      a. Prohibited Admixtures:
         1) Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions by weight of cement are not permitted.
         2) No admixture shall cause an increase in shrinkage when tested in accordance with ASTM C157.
   5. Mix Designs with Silica Fume:
      a. Additional Mix Design Requirements:
         1) Ready mix Supplier and Owner’s testing laboratory shall independently perform air content tests of silica fume mix design in accordance with ASTM C231 or ASTM C173. Verify air content with unit weight test.
         2) Ready mix Supplier and Owner's testing laboratory shall independently perform air content tests of hardened silica fume mix design in accordance with ASTM C457.
   6. Strength and Water-Cementitious Material Ratio (ACI 301 4.2.2.9):
      a. As indicated on Drawings.
      b. Include weight of fly ash, silica fume, and GGBS additives with weight of cement to determine water-cementitious materials ratio.

1.5 SUBMITTALS

A. Submittals (ACI 301 Submittals Checklist): Additional Submittal requirements as follows:
   1. For Review:
      a. For mix designs on each class of concrete a minimum of 3 weeks prior to placing concrete.
         1) Mix designs prepared in accordance with ACI 301.
            a) Proportions shall be in accordance with ACI 211.1.
      b. New design mixes when change in materials are required or necessary.
      c. Pour sequence noting construction joint locations.
      d. Materials and methods for concrete curing.
      e. Cold weather placement procedures.
      f. Wet weather protection procedures.
      g. Hot weather placement procedures.
      h. Prior to making structural repairs to concrete, patching materials to be used and method of application.
      i. Bonding grout mix design.
   2. For Record:
      a. ACI certification of concrete finisher(s).
      b. Upon request, concrete delivery tickets.
      c. Laboratory test results of any site-batched concrete aggregate moisture content.

1.6 QUALITY ASSURANCE

A. Quality Assurance (ACI 301 1.6): Additional requirements as follows:
1. General (ACI 301 1.6.1):
a. Hold a pre-pour meeting with Contractor, Owner's testing laboratory, and Engineer (prior to placement of concrete) to review proposed mix designs and procedures.
1) Comply with the following guidelines:
a) Hold pre-pour meeting at least 5 days prior to start of concrete placement.
b) Send out a pre-pour agenda in advance of meeting.
c) Distribute minutes to attendees within 3 business days.
b. Perform Work in accordance with laws and regulations of applicable building codes and with other authorities having jurisdiction, that take precedence over requirements of this Specification, except where requirements of Specifications are more exacting or stringent, they shall govern.
2. Testing responsibilities of Contractor (ACI 301 1.6.3):
a. Provide Owner's testing laboratory, for their reference, proposed mix designs.
b. Advise Owner's testing laboratory a minimum of 48 hours in advance of operations.
c. Report testing irregularities to Engineer.
d. If, at any time during construction, it is desired to deviate from approved mix designs, Contractor's testing laboratory may modify mix design, subject to Engineer's review.
3. Admixture Manufacturer shall make available a qualified Manufacturer's representative to assist Contractor and Engineer as specified in this Section.
4. Corrosion Inhibitor Dispensing Requirements:
a. Ready mix Supplier shall have corrosion inhibitor Manufacturer's Representative perform following:
1) Install "low level pump cutoff device" in dedicated calcium nitrite corrosion inhibitor tank.
a) Devices shall shut off dispenser pump in event of insufficient product.
2) Install visual reference (such as bottle or other reviewed device) for dispensing calcium nitrite corrosion inhibitor.
a) Visual reference shall be accessible to Owner's testing laboratory, Manufacturer's representative, and Engineer.
3) Calibrate dispensing system at initial equipment installation and annually thereafter.
a) Install tamperproof seals after each calibration of system.
b. Ready mix Supplier shall perform following:
1) Verify contents of visual reference prior to discharge of product for each batch.
a) If visual reference does not indicate specified amount of corrosion inhibitor, ready mix Supplier shall stop production and notify corrosion inhibitor Manufacturer/Supplier immediately.
5. Admixtures shall be from single Manufacturer, where possible. Issue a letter from several manufacturers certifying compatibility with ingredients in the proposed mix design.
6. A minimum of one concrete finishing crew member shall be an ACI Certified Concrete Flatwork Finisher or equivalent for slabs on grade and supported slabs.
a. Equivalent finisher certification programs shall include both written and performance examinations.
b. Certified finisher shall have input to crew's placement and finishing procedures regarding application of ACI Standards for quality flatwork.
c. Designate a certified finisher in advance of operations and warrant continued participation.
d. Applicable standards are contained in ACI "Concrete Craftsman Series."
7. Nondestructive tests will not be permitted to determine in-place strength.
8. Contractor, or restoration subcontractors, shall have not less than 2 years' experience in the field of structural concrete restoration work.
9. Sound repaired areas with a chain drag or hammer 7 days after concrete placement.
a. Repair hollowness detected by removing and placing new patch or affected area at no extra cost to Owner.
10. Maintain drawing locating concrete repairs performed under this Section. Indicate location and size of repairs such as patches and overlays on clean drawing.
a. Maintain a separate drawing for each level and ceiling plan.

1.7 DELIVERY, STORAGE AND HANDLING

A. Materials Storage and Handling (ACI 301 4.1.4): Additional requirements as follows:
1. Store materials on platforms off ground; protect stored cement against elements.
2. Handle and store aggregates separately in a manner to prevent intrusion of foreign material.
3. Protect material until used.
4. Do not use materials which have deteriorated or have been damaged.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Products (ACI 301 4.2): Additional requirements as follows:
1. Cementitious material (ACI 301 4.2.1.1).
2. Aggregates (ACI 301 4.2.1.2):
a. Coarse Aggregate: Gravel, crushed gravel, crushed stone, or other reviewed inert materials of similar characteristics, meeting ASTM C33 class designation as follows:
1) Footings and Piers: Class 1S.
2) Walls: Class 4S.
3) Columns, Beams, Slabs, and Other Members: Class 5S.
3. Admixtures (ACI 301 4.2.1.4):
a. Use admixtures to provide proper workability, finishability, and setting times at low water-cementitious ratios and to increase compressive strength, of concrete as reviewed by Engineer.
b. Use reviewed admixtures and dosage rates as necessary unless indicated otherwise on Drawings.
1) Use in accordance with Manufacturer's recommendations.
2) Add admixtures at separate intervals or locations of mix cycle.
c. Air Entraining Admixtures: Specific admixture to be selected by admixture representative and reviewed by Engineer.
1) ASTM C260.
2) Acceptable Materials:
a) Sika AIR Series, AEA-14 or AEA-15, Sika Corp.
b) Darex or Daravair Series, GCP Applied Technologies.
c) MB or Micro-Air Series, BASF Admixtures.
d) AEA, Air Mix or Eucon Air Series, Euclid Chemical Company.
e) Catexol Series, Axim Italcementi Group.
f) Or reviewed equal.
d. Chemical Admixtures: Specific admixture to be selected by admixture representative and reviewed by Engineer.
1) Water Reducing Admixtures:
a) ASTM C494, Type A.
b) Acceptable Materials:
(1) Plastocrete, Sika Corp.
(2) WRDA or ADVA Series, GCP Applied Technologies.
(3) Pozzolith Series, BASF Admixtures.
(4) Eucon Series, Euclid Chemical Company.
(5) Catexol Series, Axim Italcementi Group.
(6) Or reviewed equal.
2) Midrange Water Reducing Admixture, Conventional Slump Concrete, 6 Inches to 8 Inches:
a) ASTM C494, Type A.
b) Use shall not change the requirements of:
(1) Water/cementitious ratio.
(2) Concrete strength.
(3) Air content.
(4) Specification for placing, finishing, and curing.
3) Acceptable Materials:
a) Sikament AFM or Sikament 686, (Sikament Series), Sika Corp.
b) Daracem , MIRA, or ADVA Series, GCP Applied Technologies
c) Polyheed Series, BASF Admixtures

d) Eucon Series, Euclid Chemical Co.
e) Catexol Series, Axim Italcementi Group

4) High Range Water Reducing Admixture, 6 Inches to 10 Inch Slump Concrete:
   a) ASTM C494, Type F or G.
   b) Use shall not change requirements of:
      (1) Water/cementitious ratio.
      (2) Concrete strength.
      (3) Air content.
      (4) Specification for placing, finishing, and curing.
   c) Acceptable Materials:
      (1) Sikament AFM or Sikament 686, (Visocrete Series), Sika Corp.
      (2) ADVA or Daracem Series, GCP Applied Technologies.
      (3) Glenium Series or Rheobuild 1000 or 716, BASF Admixtures.
      (4) Eucon or Plastol Series, Euclid Chemical Company.
      (5) Catexol Series, Axim Italcementi Group.
5) High Range Water Reducing Admixture (superplasticizer), Self-consolidating concrete:
   a) ASTM C1017 Type I or II.
   b) Use shall not change requirements of:
      (1) Concrete strength.
      (2) Air content.
      (3) Specification for placing, finishing and curing.
   c) Acceptable Materials.
      (1) Sikament 300 or 686, (Visocrete Series), Sika Corp.
      (2) ADVA or Daracem Series, GCP Applied Technologies.
      (3) Glenium Series, BASF Admixtures.
      (4) Plastol Series, Euclid Chemical Company.
      (5) Catexol Series, Axim Italcementi Group.
      (6) Or reviewed equal.
6) Non-corrosive Non-chloride Accelerator:
   a) ASTM C494, Type C or E.
   b) Admixture shall not contain more chloride ions than are present in municipal drinking water.
   c) Admixture Manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures.
   d) Acceptable Materials:
      (1) Plastocrete 161 FL or Sikaset NC, (SikaSet Series), Sika Corp.
      (2) Daraset Series, Lubricon NCA, DCI, or Polarset, GCP Applied Technologies.
      (3) Pozzutec Series, BASF Admixtures.
      (4) Accelguard Series, Euclid Chemical Co.
      (5) Catexol 2000RHE, Axim Italcementi Group.
7) Calcium Nitrite-Based Corrosion Inhibitor:
   a) ASTM C494 Type C.
   b) Acceptable Materials:
      (1) Sika CNI, Sika Corp.
      (2) DCI or DCI-S Corrosion Inhibitor, GCP Applied Technologies.
      (3) Rheocrete CNI, BASF Admixtures.
      (4) Catexol 1000 CN-CI, Axim Italcementi Group.
      (5) Eucon CIA, Euclid Chemical Company.
8) Shrinkage Reducing Admixture:
   a) Acceptable Materials:
      (1) Eclipse, GCP Applied Technologies.
      (2) Sika Control 40, Sika Corp.
      (3) Tetraguard AS20, BASF Admixtures.
      (4) Eucon SRA or SRA XT, or Conex, Euclid Chemical Company.
   b) Do not use in combination with corrosion inhibitor unless concrete is not susceptible to freeze/thaw environment.
      (1) Conex may be used in freeze/thaw environments.

4. Mineral Admixtures:
   a. Fly Ash:
      1) If used, shall not exceed 25% by weight of total cementitious material weight in mix design.
      2) Conform to ASTM C618, including optional requirements on available alkalis, Class C or F, sampling and testing in accordance with ASTM C311.
      3) Loss of ignition (carbon content) shall be limited to 4%.
      4) Use of fly ash shall not alter specified levels of air entrainment nor reduce strength requirements for any mix.
   b. Silica Fume:
      1) Conform to ASTM C1240 requirements as a liquid slurry or dry densified.
      2) Acceptable Materials:
         a) Sikacrete 950 DP, Sika Corp.
         b) Force 10,000 or Force 10,000-D, GCP Applied Technologies.
         c) Rheomac SF100, BASF Admixtures.
         d) Eucon MSA, Euclid Chemical Company.
         e) Catexol SF-D, Axim Italcementi Group.
         f) Or reviewed equal.
      3) Self disintegrating bags designed to be disposable in batch are prohibited.
5. Ground Granulated Blast-Furnace Slag (GGBS):
   a. If used, shall not exceed 40% by weight of total cementitious material in mix design.
   b. Conform to ASTM C989, Grade 100 or higher.
6. Maximum Percent of Total Cementitious Materials:
   a. Where both fly ash and slag are used in a mix design their total shall not exceed 35% by weight of the total cementitious material in the mix design for slabs and 50% for formed members.
   b. Where fly ash, slab and silica fume are used a single mix design, total shall not exceed 42% by weight of the total cementitious material in the mix design.
7. Fibrous Concrete Reinforcement – Plastic Crack Control:
   a. 100% virgin polypropylene (collated fibrillated monofilament materials).
      1) Dosage rate 1.5 lb/cu. yard of concrete minimum, containing at least 3 million individual fibers.
   b. 100% virgin polypropylene (fibrillated microfilament materials).
      1) Dosage rate 1.0 lb/cu. yard of concrete minimum, containing at least 25 million individual fibers.
   c. Minimum Length: 0.75-inch.
   d. Meet minimum plastic shrinkage crack reduction of 70% when tested in accordance with ICBO ES, Appendix B (7-92).
   e. Meet requirements of ASTM C1116, "Standard Specification for Fiber-Reinforced Concrete and Shotcrete", designation Type III, 4.1.3.
   f. Acceptable Materials:
      1) Gilco, Grace Fibers or Grace Micro Fibers, GCP Applied Technologies.
      2) Fibermesh Inforce e3 or Stealth e3, FibreMesh Co., Chattanooga, TN.
      3) Forta Fiber-CFP, Forta Corp., Grove City, PA.
      4) Axim Fibrasol F, Axim Concrete Technologies.
      5) Fiberstrand, The Euclid Chemical Company.
      6) Sika Fiber, Sika Corp.
      7) Or reviewed equal.

B. Materials (ACI 301 5.2.1): Additional requirements as follows:
   1. Waterproof Sheet Materials (ACI 301 5.2.1.2):
      a. Acceptable Materials:
         1) Waterproof paper over burlap.
         2) White polyethylene film over burlap.
         3) White polyethylene-coated burlap.
   2. Evaporation Retarder:
      a. Acceptable Materials:
         1) SikaFilm, Sika Corporation.
         2) MasterKure ER 50, BASF Corporation Construction Systems.
         3) Eucobar, Euclid Chemical Company.
         4) E-Con, L & M Construction Chemicals, Inc.
         5) Or reviewed equal.

3. Grout:
    a. Non-precision, non-shrink, non-stain. non-metallic grout in accordance with Manufacturer's recommendations.
        1) ASTM C1107.
        2) Strength as indicated on Drawings.
        3) Match color of cured grout used on cast-in-place and precast concrete to color of surrounding concrete.
            a) Note that silica fume concrete surfaces will be darker than conventional concrete.
        4) If products are unable to provide color match, then alternate products will be subject to the review of Engineer.
    b. Acceptable Materials:
        1) Sika Grout 212, Sika Corporation.
        2) MasterFlow 100, BASF Corporation Construction Systems.
        3) NS Grout, Euclid Chemical Company.
        4) Duragrout, L & M Construction Chemicals, Inc.
        5) Or reviewed equal.
    c. When high fluidity precision grout or increased placing time, or both, is required, use high flow grout.
        1) Acceptable Materials:
        2) Sika Grout 328, Sika Corporation.
        3) Masterflow 928, BASF Corporation Construction Systems.
        4) Hi-Flow Grout, Euclid Chemical Company.
        5) Or reviewed equal.

2.2 MIXES

A. Measuring, Batching, and Mixing (ACI 301 4.3.1): Additional requirements as follows:
    1. Ready Mix Concrete:
        a. Furnish delivery ticket with each load of concrete delivered. In addition to requirements of ASTM C94 Section 16, provide following information on delivery tickets:
            1) Type of aggregate.
            2) Total water content.
            3) Air entrainment.
            4) Slump.
            5) Silica fume (if used) admixture content per cubic yard of concrete.
            6) Fly ash (if used) content per cubic yard of concrete.
            7) GGBS (if used) content per cubic yard of concrete.
            8) Water-cementitious materials ratio.
            9) Corrosion inhibitor.
            10) High range water reducing admixture.
            11) Fibrous concrete reinforcement.
    2. Slump Adjustment (ACI 301 4.3.2.1):
        a. In accordance with ASTM C143.
        b. Provide slump guidelines adhering to strength and water/cementitious ratio requirements.
        c. Mix design shall provide water slump for concrete and after addition of superplasticizers.
        d. Water is not to be added at Site to meet specified slump, unless specifically indicated as being withheld on concrete batch ticket and reviewed by Engineer.
        e. High range water reducing admixtures (superplasticizers), if added at batch plant, may be redosed at Site.
            1) Manufacturers shall provide a redosage chart for this purpose.
            2) If superplasticizers are added at batch plant, concrete delivery time, placement, and finishing procedures shall account for limited time affect.
            3) If superplasticizer is added at Site after verification of initial slump, completely retest concrete after proper mixing.
            4) Concrete containing superplasticizer shall have a maximum 9-inch slump unless otherwise reviewed by Engineer.
    3. Time of Discharge (ACI 301 4.3.2.2):
        a. Concrete trucks shall not have concrete build-up on drum or have worn fins.
            1) Engineer may require inspections to verify conformance to NRMCA Quality Control Manual, Section 3.

b. Time of discharge after batching shall not exceed 90 minutes or after drum has revolved 300 revolutions unless otherwise reviewed by Engineer.

4. Take air content tests of concrete at point of discharge unless otherwise reviewed by Engineer.
5. Silica Fume Concrete - Additional Mixing Requirements:
   a. Sequence and method of charging mixer, transportation, discharging and placement of silica fume concrete shall be reviewed with silica fume Manufacturer's representative.
   b. For all types of mixing equipment, increase mix times by 40% over minimum mix time required to achieve mix uniformity as defined by ASTM C94.
   c. For truck-mixed and central mixed silica fume concrete, maximum allowable batch size shall be 80% of maximum as called out by ASTM C94.
6. Fibrous Concrete Reinforcement - Additional Mixing Requirements:
   a. Add fibers at a maximum rate of 4 pounds per cubic yard of concrete as indicated on Drawings, Specification, or as reviewed by Engineer in accordance with Manufacturer's recommendations and within time and location of initial concrete batching as specified in ASTM C94.
7. Prepackaged Materials Used in Concrete (ACI 301 4.3.1.3):
   a. Mix and install concrete patching materials and prime existing concrete surface in accordance with Manufacturer's recommendations.
   b. Site mixing operation shall be approved by Manufacturer and produce sufficient concrete so that placement and finishing operation can proceed at a steady pace.

PART 3 - EXECUTION

3.1 GENERAL

A. General (ACI 301 5.1): Additional requirements as follows:
   1. Placement Notification (ACI 301 5.1.2.2.b): Notify Owner's testing laboratory and Engineer 48 hours in advance of concrete operations.
   2. Before placement of concrete:
      a. Complete formwork for elements such as footings, columns, walls, beams, and slabs.
      b. Remove foreign material.
      c. Secure reinforcement in place.
      d. Obtain review by Engineer of preparation.

3.2 PREPARATION

A. Preparation (ACI 301 5.3.1): Additional requirements as follows.

B. Before placement of topping, pre-dampen surfaces of precast members. No standing water is allowed on surfaces during the concrete placement.

C. Before placement of repair material pre-dampen surfaces of cavities. No standing water is allowed on surfaces during the concrete placement.

D. Coordinate Work with other trades to allow reasonable time to set sleeves, inserts and other accessories.

E. Conveying Equipment (ACI 301 5.3.2.3): Support pump hoses; do not lay hoses on reinforcement.

F. Consolidating (ACI 301 5.3.2.5):
   1. Do not allow vibrators to touch reinforcement embedded in partially set concrete.
   2. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine.
   3. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer.
   4. Do not insert vibrators into lower layers of concrete that have begun to set.
   5. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

G. Bonding Grout:
   1. Abrasive blast concrete bonding surfaces to a clean sound substrate prior to concrete placement.
   2. Apply bonding grout pneumatically (brush) to existing concrete bonding surface immediately prior to concrete placement.
   3. Apply bonding grout evenly to a uniform minimum thickness of 1/16-inch to 1/8-inch throughout. Do not allow grout to dry or dust prior to placement of repair material.
   4. Provide 1 shop vacuum capable of removing water and remove standing water from repair cavity prior to bonding grout application.

H. If construction joints are permitted, do not place new concrete until contact surface of concrete in place has been swept with a stiff brush or scraped to remove laitance and roughened.
   1. One hour prior to concrete placement, pre-wet bonding surface or soil with a uniform spray application of water.
   2. Maintain surface in a damp condition; blow puddles clean.
   3. Coat bonding surface with a thin layer of bonding grout immediately prior to placement of concrete.
   4. Work bonding grout into bonding surfaces with stiff brooms or brushes.

3.3 PLACEMENT OF CONCRETE

A. Placement of Concrete (ACI 301 5.3.2): Additional requirements as follows:
   1. Cold Weather (ACI 306.1, ACI 301 5.3.2.1.b):
      a. Record air temperature no less than twice per 24-hour period.
      b. Cast expendable thermostats or thermo-couplers in concrete at rate of at least one per 100 cubic yards of concrete placed for supported structure.
         1) Monitor internal temperature of concrete at 12-hour maximum intervals throughout curing process.
      c. Record temperature of concrete for each batch as delivered.
      d. Warm mix water, sand, and aggregate as required so that no frozen lumps of ice, snow, or aggregate will survive mixing, but do not overheat ingredients to cause flash setting of concrete or loss of entrained air.
      e. Specified non-corrosive accelerator may be used.
      f. Do not place concrete unless air temperature is at least 20 degrees F and rising.
      g. Use evaporation retarder or water fog after finishing to ensure that plastic shrinkage cracking of concrete surface does not occur.
      h. Cure slabs with Visqueen and insulated blankets placed on slab as soon as possible after concrete will support them without deformation.
      i. Do not wet cure concrete placed under cold weather conditions.
      j. Maintain curing of supported slabs, continuous presence of Visqueen and blankets. no less than 10 days.
   2. Hot Weather (ACI 305, ACI 301 5.3.2.1.c):
      a. Temperature of concrete as delivered shall not exceed 90 degrees F, unless reviewed by Engineer.
      b. Cool forms, reinforcing, and air by water fog spraying immediately before placing concrete.
      c. Protect flatwork during finishing operations as follows:
         1) Immediately following screeding, apply an evaporator retarding agent in accordance with recommendations of Manufacturer.
            a) Additional applications of evaporation retarding agent may be required.
         2) Continuous fog spray of air above slab between finishing operations.
         3) Cover concrete with a reviewed moisture-retaining cover as soon as concrete will support it without deformation.
            a) Keep mats constantly wet for 7 days minimum. Leave mats in place for 3 additional days after discontinuing wetting process.
   3. Wet Weather (ACI 301 5.3.2.1a):
   4. Do not place grout used to prime concrete pump and pump line into Work.
   5. During periods of setting, place no materials or impose loads on slabs. Support plank runways for accommodation of workers or for other traffic by blocking.
   6. Construction Joints and Other Bonded Joints (ACI 301 5.3.2.6):
      a. Construct control and isolation joints as indicated on Drawings.
      b. Coordinate configuration of tooled joints with joint sealant Manufacturer. Refer to Division 07 Section “Joint Sealants for Parking Structures.”

c. Tool slab joints at time of finishing. Saw cutting is not allowed.
d. Maximum variation between slab surfaces at joints shall not exceed 1/16-inch.
e. Edge concrete patches to match existing conditions such as beam and column chamfers, unless noted.
f. Set bulkheads to limit each placement to predetermined construction joints, normal and vertical to section to be placed and leave in place until concrete has sufficiently set. Use care when removing bulkheads to prevent spalling of concrete surface. Remove concrete passing through bulkhead before adjacent placement.
g. Tool construction or control joints passing through patches for continuity.

3.4 FINISHING FORMED SURFACES

A. Finishing Formed Surfaces (ACI 301 5.3.3): Additional requirements as follows:
1. Rough-Form finish (ACI 301 5.3.3.3.a): Concealed concrete, such as behind masonry, below grade, or abutting other structures may have a “rough form finish.”
2. Smooth-Formed Finish (ACI 5.3.3.3.b): Concrete surfaces exposed to public view, both inside and outside structures shall have a “smooth form finish.”

3.5 FINISHING UNFORMED SURFACES

A. Finishing Unformed Surfaces (ACI 301 5.3.4): Additional requirements as follows:
1. General:
a. Spraying water directly on concrete surfaces is not allowed.
b. Use rigid screed rails; wet screeding is not accepted.
2. Float Finish (ACI 5.3.4.2.b):
a. Flat work in parking and drive areas.
1) Begin bull floating immediately after screeding of concrete.
2) When bleed water has left surface, begin final “float finish” operation.
3. Broom or Belt Finish (ACI 301 5.3.4.2.d):
a. Slab areas to receive a deck coating shall have a “light broom finish,” or as recommended and approved by coating Manufacturer and reviewed by Engineer.
b. Slab areas not receiving a deck coating shall have a medium broom finish.
c. Ridges shall not exceed 1/8-inch in height.
d. Notify Engineer to observe and review final finish texture.
e. Provide "light broom finish" at stair treads, and a "light broom finish" for stair landings. Obtain Engineer’s review of texture.
f. No refloating or finishing is required after brooming.
4. Additional Finishing Requirements for slab-on-grade as follows:
a. Finish concrete using procedures to preclude plastic and drying shrinkage cracking.
b. Note that the use of low water/cementitious ratio concrete, silica fume, and GGBS will essentially eliminate bleed water.
c. Fog misting air above flat work is recommended.
1) Free standing water is not allowed.
2) Do not spray water directly on flat work.
d. Do not use fog misting to apply water to surface of concrete to facilitate lubrication for finishing purposes.
e. Provide fog misting when conditions of hot weather concrete exist in accordance with “Hot Weather Concreting” as specified herein.
1) Continue fogging after finishing operation until moisture retaining cover is placed over concrete.
f. Finish concrete to texture matching reviewed Sample or as required by the deck coating Manufacturer.

3.6 CURING AND PROTECTION

A. Curing and Protection (ACI 301 5.3.6): Additional requirements as follows:
1. General:
a. Curing shall maintain moisture content and temperature to ensure strength gain and prevent undesirable cracking, dusting, scaling, and crazing.

b. Cure slab-on-grade, supported concrete slabs, and concrete topping on precast as follows:
   1) Cover concrete with a reviewed moisture retaining cover as soon as the concrete will support it without deformation.
   2) Keep mats constantly wet for 7 days minimum.
   3) Leave mats in place for 3 additional days after discontinuing wetting process.
c. Additional precautions may need to be taken to prevent excessive slab moisture loss resulting in plastic shrinkage when a combination of air temperature, concrete temperature, relative humidity and wind velocity which causes a rate of evaporation in excess of 0.2 pounds per square feet per hour as determined by ACI 308, Figure 1.

2. Unformed Concrete Surfaces (ACI 301 5.3.6.2):
   a. Curing of supported slabs shall be in accordance with ACI 301 5.3.6.4.d,
      1) Apply sheet materials conforming to ASTM C171.
      2) Application of curing compounds is not allowed.
   b. For silica fume concrete mixes, follow curing procedures in accordance with requirements of silica fume admixture Manufacturer.
   c. As a minimum or as recommended by Manufacturer, protect surfaces of concrete patches with a moisture retaining cover, wet burlap as soon as surface will support it without deformation. Maintain burlap in a continuous saturated condition for 3 days.
   d. During curing period protect repairs from traffic. Halt slab demolition from above or below.
   e. Prior to reopening repairs to traffic and loading, confirm that the repair concrete has attained a minimum compressive strength of 70% of specified 28-day strength.
      1) Confirm by field cylinder, cured adjacent to, and in a manner similar to the repairs, or by the Maturity Method.
3. Formed Concrete Surfaces (ACI 301 5.3.6.3):
   a. Cure formed surfaces upon early removal of forms in accordance with ACI 301 5.3.6.4, Preservation of Moisture.

3.7 REPAIR OF SURFACE DEFECTS

A. Repair of Surface Defects (ACI 301 5.3.7): Additional requirements as follows:
   1. Match color and texture of concrete to be repaired.
   2. Repair cracks in supported concrete floor slabs and curbs by routing and sealing or epoxy injection subject to review of Engineer.
   3. Fill air pockets and holes over 1/2-inch in diameter with a sand-cement paste.
      a. Grind smooth form offsets or fins over 1/8-inch.
   4. Remove blemishes such as stains, efflorescence, rust, grease and oils, form release agents, dirt, and surface deposits.
   5. Correct low spots, which create puddles and bird baths which impede drainage, by smoothing out broom lines and grinding a drainage path (maximum 1/4-inch depth), or by patching with a specified polymer repair material.
   6. Correct high spots impeding drainage in slabs by grinding and re-texturing, subject to review of Engineer.
   7. Patch honeycombed and other defective concrete with a reviewed material.
   8. If shrinkage cracks appear in patch material prior to completion of initial 72-hour curing period, patch material will be considered defective, and it shall be removed and new material placed at no extra cost to Owner.

3.8 ACCEPTANCE OF STRUCTURE

A. In accordance with ACI 301 1.7.

END OF SECTION 03 31 26

SECTION 05 50 00 – METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing, fabrication and erection of metal fabrications, including the major items listed below:
   1. Miscellaneous frames and supports.
   2. Steel stairs, landings, and railing including posts, bearing plates and integral support beams.
   3. Steel railings.
   4. Galvanizing of selected items.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the pertinent provisions of the following:
   1. ASTM Standard Specifications:
      a. A36 - Structural Steel.
      b. A47 - Ferritic Malleable Iron Castings.
      c. A48 - Gray Iron Castings.
      d. A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
      e. A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
      f. A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
      g. A276 - Stainless Steel Bars and Shapes.
      h. A307 - Carbon Steel Bolts and Studs, 60,000 psi, Tensile Strength.
      i. A325 - Structural Bolts, Heat-Treated, 120/105 ksi Minimum Tensile Strength.
      j. A366 - Commercial Steel (CS) Sheet, Carbon (0.15 Maximum Percent), Cold-Rolled.
      k. A490 - Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.
      l. A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
      m. A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
      n. A563 - Carbon and Alloy Steel Nuts.
      o. A780 - Standard Practice for Repair of Damaged Hot-Dip Galvanized Coatings.
      p. A786 - Rolled Steel Floor Plates.
      q. A992 - Steel for Structural Shapes for Use in Building Framing.
      r. B209 - Aluminum and Aluminum Alloy Sheet and Plate.
      s. B221 - Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, & Tubes.
      t. B633 - Electro-deposited Coatings of Zinc on Iron and Steel.
      u. D520 - Zinc Dust Pigment for Paint.
      v. E488 - Strength of Anchors in Concrete and Masonry Elements.
      w. E1512 - Testing Bond Performance of Adhesive-Bonded Anchors.
      x. F436 - Hardened Steel Washers.
      y. F593 - Stainless Steel Bolts, Hex Cap Screws, and Studs.
      z. F594 - Stainless Steel Nuts.
      aa. F1267 - Expanded Metal, Steel.
      bb. F1554 - Anchor Bolts, Steel, 36, 55, and 105 ksi Yield Strength.
   2. AISC publications:
      a. Code of Standard Practice for Steel Buildings and Bridges (excluding Section 4.2.1).
      b. Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
      c. Detailing for Steel Construction.
      d. Manual of Steel Construction.
      e. Specification for Structural Joints Using ASTM A325 or A490 Bolts.

3. AWS publications:
   a. ANSI/AWS A5.1 - Carbon Steel Electrodes for Shielded Arc Welding.
   b. ANSI/AWS A5.3 - Aluminum and Aluminum Alloy Electrodes for Shielded Arc Welding.
   c. ANSI/AWS A5.4 - Stainless Steel Electrodes for Shielded Arc Welding.
   d. ANSI/AWS D1.1 - Structural Welding Code - Steel.
   e. ANSI/AWS D1.2 - Structural Welding Code - Aluminum.
   f. ANSI/AWS D1.6 - Structural Welding Code - Stainless Steel.
4. ASME - American Society of Mechanical Engineers:
   a. ANSI/ASME B18.2.1 - Heavy Hex Structural and Askew Head Bolts.
   b. ANSI/ASME B18.6.1 - Wood Screws.
   c. ANSI/ASME B18.6.3 - Slotted and Recessed Head Machine Screws.
   d. ANSI/ASME B18.21.1 - Lock Washers.
   e. ANSI/ASME B18.22.1 - Plain Washers.
5. Federal Specifications:
   a. FS FF-B-588C(1) - Bolt, Toggle, and Expansion Sleeve, Screw.
6. American Hot-Dip Galvanizers Association.
7. Occupational Safety and Health Act.
8. NAAMM - National Association of Architectural Metal Manufacturers.
9. The Aluminum Association.

1.4 CONNECTION DESIGN REQUIREMENTS

A. Fabricator:
   1. Responsible for the structural design of all connections except those specifically indicated on the Drawings as Engineer designed.
   2. Responsible for the design of moment connections where indicated on the Drawings.
   3. Coordinate type of connection (bolted or welded) with steel erector.

B. General Types of Connections: Indicated on Drawings.

C. Design of Connections:
   1. Equal to standard framing connections in accordance with AISC - Manual of Steel Construction.
   2. Minimum Load Connection:
      a. Two 3/4-inch diameter bolts, or
      b. Welds with a total capacity of 6,000 pounds.
   3. Beam connections shall be designed for a shear capacity equal to the greater of the following:
      a. 1/2 the total allowable uniform load capacity of the beam in accordance with the AISC Manual of Steel Construction, Section 2, or
      b. The actual shear load due to the combination of all loads as indicated on the Drawings.
   4. Connections: Bolted bearing type unless indicated otherwise on Drawings.
   5. By a Registered Professional Engineer licensed to practice at the location of the Work.

1.5 SUBMITTALS

A. Shop Drawings: For all members to be furnished to include:
   1. Detail Drawings of Members and Connections:
      a. In accordance with AISC - Detailing for Steel Construction.
      b. Size and number of bolts.
      c. Dimensions.
      d. Connection angles and plates.
   2. Erection Drawings: Locate and identify members.
   3. Welding: In accordance with AWS welding symbols.
   4. Type of paint.
   5. Items to be galvanized.

B. Mill Certification Tests: Submit in compliance with Michigan Building Code.

C. Provide setting drawings, templates and directions for the installation of anchor bolts and other devices.

1.6 QUALITY ASSURANCE

A. Fabrication and Erection Personnel Qualifications:
   1. Trained and experienced in the type of work being performed.
   2. Knowledgeable of the design and the reviewed Shop Drawings.

B. Welders, Welding Operators and Tackers Qualifications:
   1. Qualified by tests in accordance with AWS D1.1.
   2. Qualification Papers:
      a. Given by an independent testing laboratory.
      b. Dated no earlier than 6 months prior to beginning of Project.
   3. Engineer, at Engineer's discretion, may accept evidence of previous qualifications.

C. Steel Fabricators:
   1. Certified under the AISC Quality Certification Program for Category I - Conventional Steel Structures, or under other quality control program acceptable to building official in accordance with building code, prior to fabrication.
   2. The quality control program shall permit work on fabricator’s premises without special inspection.

D. Special Inspection of Steel Erection: In accordance with Division 01 Section “Testing Laboratory.”

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Reject damaged, deteriorated or distorted material and immediately remove from the Site. Replace rejected materials with new material at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Materials shall be new, top quality of their respective kinds, standard sizes and fabricated in a shop whose principal business is manufacturing the items specified in this Section.

B. Steel:
   1. Wide Flange and WT Shapes: ASTM A992 with yield stress of 50,000 psi.
   2. M, S, MT and ST Shapes, Channels, Angles, Bars, Plates and Rods: ASTM A36 with yield stress of 36,000 psi.
   3. Rectangular and Square Tubular Shapes: ASTM A500, Grade C with yield stress of 50,000 psi.
   4. Round Tubular Shapes: ASTM A500, Grade B with yield stress of 46,000 psi.

C. Stainless Steel Bars and Shapes: ASTM A276.

D. Paint: In accordance with Division 09 Section “Restoration Painting.”

E. Field-Applied Cold Galvanizing:
   1. Z.R.C. Cold Galvanizing Compound, ZRC Worldwide, Marshfield, MA.
   2. Or approved equivalent.

2.2 METAL FABRICATIONS

A. Steel Stairways:
   1. Design:
      a. Design shall be performed by the Supplier.
      b. Minimum Design Live Load: 100 pounds per square foot.
      c. Referenced standards of NAAMM and AISC shall be followed.
   2. Grating treads and landings sized by fabricator to carry 400-pound load on nosing and 4 bearing bars.
   3. Minimum Stringer Size: MC15 x 33.9.
   4. Support steel and connections as required.

B. Fasteners:
   1. Bolts:
      a. Use carbon or alloy steel, ASTM A325 3/4-inch diameter bolts or larger as required by connection design.
      b. Use ASTM A490 3/4-inch diameter bolts or larger only if required by connection design.
      c. If conditions require that galvanized materials be used, use ASTM A307 or A325 bolts. Do not galvanize A490 bolts, as that could possibly cause hydrogen embrittlement, and will affect hardness.
      d. Stainless steel: ASTM F593, used where conditions of severe corrosion could occur.
   2. Nuts:
      a. Carbon Steel: ASTM A563.
      b. Stainless Steel: ASTM F594.
   3. Washers:
      a. Hardened Steel Washers: ASTM F436.
      b. Plain Washers: ASME B18.22.1, round, carbon steel.
      c. Lock Washers: ASME B18.21.1, helical, spring type, carbon steel.
   4. Lag Bolts: ASME B18.2.1, square or hex head type.
   5. Toggle Bolts: Tumble wing type in accordance with FS FF-B-588.
   6. Machine Screws: ASME B18.6.3.
   7. Wood Screws: ASME B18.6.1.

C. Anchors: In accordance with Division 03 Section “Post-Installed Anchors”.

D. Anchor Rods: ASTM F1554, Grade 36.

E. Other Materials: Other materials not specifically described but required for a complete and proper installation of the work of this Section, shall be new, first quality of their respective kinds, and as selected by Contractor subject to approval of Engineer.

2.3 FABRICATION

A. General:
   1. Workmanship: Install items square and level, accurately fitted and free from distortion and defects.
   2. Temporary Bracing:
      a. Make provision for erection stresses by temporary bracing.
      b. Keep work in alignment.
   3. Welding:
      a. Steel welding shall be performed in accordance with AISC Specification and AWS D1.1.
      b. Filler metal requirements for steel welding processes shall be in accordance with AWS D1.1 and AWS A5.1.
      c. Aluminum welding shall be performed in accordance with AWS D1.2.
      d. Filler metal requirements for aluminum welding processes shall be in accordance with AWS A5.3.
      e. Stainless steel welding shall be performed in accordance with AWS D1.6.
      f. Filler metal requirements for stainless steel welding processes shall be in accordance with AWS A5.4.
      g. Welding shall be continuous along entire area of contact.
   4. Painting: All steel elements shall be hot-dip galvanized after fabrication.

5. Items fabricated from structural steel members which are to be architecturally exposed shall be given special attention for material selection with respect to rolling tolerances, surface finish and straightness.
6. Normal structural steel fabrication tolerances will not be acceptable where in conflict with the intent and requirements of this Section.
7. Curved beam sections shall be fabricated without distortion to top and bottom flange width and thickness.
8. Straightness tolerances, additive to deflection, shall not exceed ± 1/16-inch to 10 feet.
9. Cope, miter, and butt caps on exposed surfaces shall be made to the closest possible tolerances consistent with metal shop equipment and practice in order to provide a pleasing appearance.
10. Fastening shall be concealed where practicable. Thickness or metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water. Provide holes and connections for the work of other trades.

B. Galvanizing:
1. Hot-dipped galvanized after fabrication in accordance with ASTM A123.
2. 2 oz/ sq ft minimum.
3. All metal fabrications shall be hot dip galvanized unless noted.

C. Galvanized Fasteners:
1. Hot-dipped galvanized after fabrication in accordance with ASTM A153.
2. Class C (1.25 oz/sq ft) minimum coating.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect area to receive Work and report immediately in writing to Engineer, as required in General Conditions, any unacceptable conditions. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner. Commencement of erection implies acceptance of related Work.

B. Take field measurements prior to preparation of Shop Drawings and fabrication, wherever possible, but do not delay job progress by waiting for field measurements. Make an allowance for trimming and fitting where the taking of field measurements before fabrication might delay either completion of the metal fabrications work in particular or Substantial Completion of the Work in general.

3.2 INSTALLATION

A. Workmanship: Install items square and level, accurately fitted and free from distortion and defects.

B. Erection:
1. Bracing:
   a. Provide all shoring, bracing and accessories required for complete erection.
   b. Safety and adequacy of bracing and temporary bracing are the responsibility of the Contractor.
2. Trolley/Hoist Beams:
   a. Provide beveled washers and shims as required to level bottom flange of beam.
   b. Bottom flanges of welded and bolted connections shall be in perfect alignment with no deviation in flange width.

C. Coordination: Supply to appropriate trades items to be cast into concrete or embedded in masonry, complete with necessary setting templates.

D. Tightening:
1. Tighten bolts snug-tight as defined by AISC, unless otherwise noted on the Drawings.
2. Tighten bolts in slotted holes using the AISC Turn-of-the-Nut Method, unless indicated otherwise on the Drawings.
3. Where specifically indicated on the Drawings, finger-tighten nuts in connections where movement must be permitted, and tighten a jam nut over finger-tightened nut, or peen bolt threads, to prevent nut backoff.

E. Touch-up:
   1. After erection is complete, touch up all shop priming coats damaged during transportation and erection.
   2. Prime all field welds, bolt heads, nuts and abrasions using the priming paint specified for shop priming.
   3. Touch up all damaged galvanized areas with a zinc rich paint meeting ASTM D520 and ASTM A780.

F. Welding: Field welding shall be performed to the same standards and requirements of shop welding.

G. Protection: Where required, provide approved protection against galvanic action between contacts of dissimilar metal or situations that will cause deterioration of metal in contact or associated in any way.

3.3 CLEANING

A. Prior to acceptance of the work of this Section, thoroughly clean all installed materials and related areas in accordance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 05 50 00

SECTION 07 18 00 – TRAFFIC COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes providing and furnishing labor, materials, equipment and supervision to install a deck coating system, including surface preparation and crack and joint detailing.

B. Provide preparation work and joint sealants specified in Division 07 Section “Joint Sealants for Parking Structures.”

1.3 SUBMITTALS

A. Action Submittals
   1. System Description: Submit complete description of proposed traffic coating system including materials, surface preparation, joint treatments, terminations, and cure times. Include aggregate materials and repair materials for pitting, bug holes, popouts, and shallow scaling.
   2. Product Data: For each type of product, including installation instructions:
      a. Traffic Coating System.
      b. Substrate Repair Material.
      c. Primer.
      d. Base Coat.
      e. Intermediate Coat (grit coat).
      f. Top Coat.
      g. Aggregate.
   3. Shop Drawings: For traffic coatings:
      a. Include details for treating substrate joints and cracks, flashings, deck penetrations, and other termination conditions.
      b. Include proposed plan for grid layout to install each coat. Include quantities of materials, square footages, and yield calculations.
   4. Color: Submit Manufacturer's standard color chart.
   5. Sample Warranty: Submit sample warranty for approval prior to application.

B. Informational Submittals:
   1. Qualification Data:
      a. For Installer including projects, size, location, owner, and contact, engineer/architect and contact for projects that traffic coating system has been applied.
      b. Certification that Manufacturer has approved Installer.
      c. For Manufacturer's Representative.
   2. Certificates: For each type of traffic coating.
      a. Certification that the traffic coating system is compatible with products in Divisions 03 and 07 to which it will come in contact.
      b. Certification of Manufacturer's approval of surface preparation.
      c. Certification of Manufacturer's project review and that traffic coating installation is in accordance with written recommendations.
      d. Written certification that recoat system is compatible with existing system.
   3. Field Quality-control Reports:
      a. Results of slab moisture testing completed in accordance with ASTM D 4263 Standard Test Method for Indicating Moisture in Concrete by Plastic Sheet Method.
      b. Results of dry and wet film thickness testing and adhesive testing. Include date, weather, and other pertinent information.
   4. Applicator's Manual: For each type of traffic coating.

5. Material Safety Data Sheets: For each product, solvent, or related chemicals to be used and certification that materials conform to local, state, and federal environmental and worker's safety laws and regulations.
6. Maintenance Data: Manufacturer's "Snow Removal Guideline" stating procedures to follow during snow removal from traffic coated slabs.
7. Copies of purchase order and invoices indicating quantities and dates of material purchased.

1.4 QUALITY ASSURANCE

A. Manufacturer's/Installer's Requirements:
   1. Deck coating Installer shall be approved by deck coating Manufacturer.
   2. A minimum of 5 years' experience in application of one of the approved deck coating systems and have experience with 5 projects in size of 50,000 square feet or greater.
   3. Review slope of slabs and condition of surfaces prior to Bidding.
   4. Manufacturer shall make available a qualified Representative to assist as specified herein. Representative shall be experienced in placement of deck coating systems. As a minimum, Representative shall be on site to review following procedures:
      a. Surface preparation and deck coating installation in trial area.
      b. Installation of deck coating from primer to top coat for first level or first phase.
   5. Preconstruction/Preapplication Meeting: Attendance is required to discuss detailing, surface preparation, application techniques and procedures, phasing and scheduling. Foreman and lead laborer for Installer will be required to attend meeting along with Contractor, Manufacturer's Representative and Engineer.

B. Testing Requirements: Installer shall check deck coating wet film thickness and record test results by taking 5 wet film readings within a 1 Square Foot area. Wet film thickness testing shall be completed a minimum of once per every 5,000 Square feet of deck coating placed or per individual section placed per day. Average film thickness shall be at or above wet film thickness equivalent of specified dry film thickness.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Deck Coating Materials: Confirm that deck coating materials used are in accordance with this Section conform to local, state, and federal environmental and workers' safety laws and regulations.
   1. VOC content of materials shall not exceed limits per Environmental Protection Agency Natural Volatile Organic Compound Emission Standards for Architectural Coatings (40CFR59).

B. Fume Control: Take necessary precautions against injury to personnel or adjacent building occupants during application. As a minimum, take the following precautions:
   1. Provide and maintain barricades.
   2. Locate and protect building air intakes during application.
   3. Follow state, federal, and local safety regulations.
   4. Follow Manufacturers' safety requirements.
   5. Dispose empty containers immediately and properly.
   6. Use protective equipment.
   7. Ensure Work area is well vented to outside.

1.6 DELIVERY, STORAGE AND HANDLING

A. Ship in weather-proof enclosures, in weather-proof containers or in weatherproofing packaging. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable. Include the following:
   1. Name of product.
   2. Name of Manufacturer.
   3. Date of Manufacturer.
   4. Lot or batch number.
   5. UL Labels.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, and damage by weather or elements, and according to Manufacturer's directions.

C. Reject damaged, deteriorated, or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

D. At no time shall weight of stored material placed on a slab area exceed 30 pounds per square foot or 2,000 pounds over 20 square inches.

1.7 WARRANTY

A. Requirements:
1. Provide to Owner a Warranty by Installer and Manufacturer that deck coating system will be free of defects, water penetration, and chemical damage related to system design, workmanship or material deficiency, consisting of, but not limited to:
a. Surface crazing of other weathering deficiency (including ultraviolet light exposure).
b. Abrasion or tear failure resulting from normal traffic use.
c. Tear failure resulting from new or existing cracks in substrate not exceeding 1/16 inch in width.
d. Debonding from substrate or delaminating between layers.
e. Defective installation.
f. Debonding or damage of repair material used for filling in pitting, bug holes, popouts, and shallow scaling with concrete or deck coating material.
2. Shall be "Joint and Several" in which Installer and Manufacturer will jointly and severally warrant and provide at no charge to Owner materials and labor needed to properly repair or replace product and replace parking stripes within duration of Warranty. In event of either party's non-performance, full burden and responsibility for Warranty repair shall fall upon remaining party.
3. Vandalism, abrasive maintenance equipment, and construction traffic are not normal traffic use and are exempt from Warranty.
4. Normal traffic is considered to include snow removal equipment with rubber tipped blades as described in National Parking Association publication, "Parking Garage Maintenance Manual".
5. New concrete may experience shrinkage. Installer shall provide system suitable for such application. Warranty shall cover deck coating damage due to new concrete slab cracking not exceeding 1/16 inch.
6. Recoat systems are applied over existing systems. Installer shall provide system suitable for such application. Warranty shall cover recoat system.

B. Warranty Duration:
1. Bid price shall include a 5 year Warranty commencing with date of project acceptance in accordance General Conditions.
2. Although completed areas of facility may be reopened to traffic and parking, commencement of Warranty period will not occur prior to acceptance of entire project.
3. A single Warranty commencement date will apply to waterproofing.

PART 2 - PRODUCTS

2.1 DECK COATING - GENERAL

A. Fluid applied, waterproof, traffic bearing elastomeric membrane capable of preventing penetration of concrete by water, gasoline, oils, greases, salts, deicer chemicals, battery acids and radiator coolants.

B. Color: Gray deck coating with Owner selecting shade of gray from standard color chart submittal.

C. Provide material to fill in pitting, bug holes, popouts, and shallow scaling in accordance with Manufacturer's written recommendations.

D. Use same Manufacturer's deck coating system throughout.

E. Deck coating thicknesses specified herein are minimum dry film thicknesses and do not include the aggregate. Specified thicknesses may vary from Manufacturer's literature. A coat may have to be installed in more than 1 layer to achieve minimum thickness or on ramps a slope grade version of deck coating material shall be used. Install each coat in accordance with Manufacturer's recommended yield for required thickness.

F. Thinner or solvent to deck coating materials is not allowed.

G. Utilize a UV stable topcoat for deck coating.

H. Top coat: Seeded with aggregate and back roll.

2.2 DECK COATING – URETHANE FULL SYSTEM

A. Provide a heavy duty urethane deck coating system as indicated on Drawings.

B. Approved Heavy Duty Urethane Solvent-Free Deck Coating Systems:
1. Iso-Flex 760U-HL HVT, LymTal International, Inc., Orion, MI. Primer, base coat at 25 mils, grit coat at 25 mils, and top coat at 18 mils.
2. Auto-Gard FC, Neogard Corporation, Dallas, TX. Primer, base coat at 25 mils, grit coat at 25 mils, and top coat at 18 mils.
3. MasterSeal Traffic 2500, BASF Building Systems, Shakopee, MN. Primer, base coat at 25 mils, grit coat at 25 mils and top coat 295) at 18 mils.
4. Sikalastic 720/745, Sika Corporation, Lyndhurst, NJ. Primer, base coat at 25 mils, grit coat at 25 mils, top coat at 18 mils.
5. Vulkem 360NF/950NF/951NF, Tremco, Cleveland, OH. Primer, base coat at 25 mils, 2 grit coats at 25 mils, top coat at 18 mils.
6. Qualideck, APT, Harmony, PA. Primer, base coat at 25 mils, grit coat at 25 mils, top coat at 18 mils.

2.3 DECK COATING – AGGREGATE

A. Approved aggregates for heavy duty deck coating systems shall be a size of 12/20 and approved by coating manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION AND COORDINATION

A. Inspect surfaces to receive Work and report immediately in writing to Engineer as required in General Conditions deficiencies in surface which render it unsuitable for proper execution of this Work. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner in accordance with Engineer.

B. Coordinate and verify that related Work meets following requirements:
1. Concrete surfaces are finished, cleaned and prepped, and have completed required curing period.
2. Previous surface treatments have been removed or are compatible with the systems to be installed.
3. Systems selected for use are compatible with each other.
4. Concrete repairs are completed.
5. Sealant installation may occur several months prior to deck coating. Installer to repair damaged or defective sealants prior to deck coating installation.

3.2 PREPARATION

A. Remove oil, grease spots, and contaminates in accordance with Manufacturer's recommendations.

B. Remove the existing striping.

C. Shotblast concrete surfaces to receive deck coating. Shotblast equipment performance requirements are as follows:
1. Equipment shall be capable of traveling at a constant speed to provide uniform profile. Speed and size of equipment and size of steel shot shall be selected to provide desired preparation without causing unnecessary damage to concrete surface.
2. Equipment shall vacuum up, or otherwise retain dirt, dust, and debris from blasting operation.

3. Areas inaccessible to shotblaster (i.e., vertical surfaces, against walls, columns, stairways, etc.) are to be abrasive blasted or abraded to same performance.
4. Shotblasted surface must be clean with a profile in which a minimum 1/16 inch of existing concrete surface is removed. Fine aggregates must be exposed; however, coarse aggregate must not be exposed. Remove laitance. Surface profile to match ICRI CSP5 in accordance with ICRI Guideline No. 03732, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
5. Remove debris immediately after surface preparation. Debris includes, but is not limited to, shot, aggregate and dust. Debris shall be placed in a covered dumpster or a covered area where it will not be rebroadcast by wind or weather.

D. Metal surfaces that are to be deck coated shall be abrasive blasted to near white metal, SSPC SP10 in accordance with Steel Structures Painting Council Painting Manual. Rust inhibitive primer shall be installed in accordance with Manufacturer's recommendations within 8 hours of abrasive blasting.

E. Rout and seal cracks greater than 15 mils in accordance with Division 07 Section “Joint Sealants for Parking Structures” or as required by the Manufacturer. Cracks, coves, terminations and unusual situations shall be detailed in accordance with Manufacturer's recommendations.

F. Repair or replace materials damaged by surface preparation operations.

G. Surfaces shall be air blown with sufficient pressure to remove excess dirt, dust and debris, and to assure that concrete is clean prior to application of deck coating.

H. After shotblasting and abrasive blasting and prior to first coat of deck coating, pitting, bug holes, popouts, and shallow scaling shall be prepared in accordance with Manufacturer's recommendations. As a minimum, a thin epoxy mortar shall be used to fill voids.

3.3 ADDITIONAL PREPARATION REQUIREMENTS – EXISTING COATING SYSTEM

A. Prepare existing coating system in accordance with Manufacturer's written recommendations. As a minimum:
1. Remove existing coating that is debonded or damaged.
2. Identify and repair concrete damage prior to installation.
3. Remove and replace failed crack and construction joint sealants prior to installation.
4. Clean existing coating by power washing with Manufacturer's approved detergent, using stiff brooms to clean surface, and removing grease with Manufacturer's approved chemical cleaner.
5. Shotblast existing coating system.
6. Remove additional damaged or debonded existing coating after shotblasting.
7. Sensitize existing coating in accordance with Manufacturer's recommendations.

3.4 INSTALLATION/APPLICATION

A. Complete Work in strict accordance with Manufacturer's written instructions and specifications and as indicated herein.

B. Do not apply deck coating materials until concrete has been air dried at temperatures at or above 40 degrees F for at least 28 days after curing period specified in Division 03 Section “Cast-In-Place Concrete for Parking Structures,”, Section “Minor Concrete Repair,” or as otherwise approved by Manufacturer.

C. Concrete shall be dry prior to application of deck coating. Installer shall perform slab moisture testing in accordance with ASTM D 4263 Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method. Testing must be performed in at least 1 location for every 10,000 SF of coating. Use of heat lamps for performing tests may be required in areas not exposed to sunlight.

D. Do not apply deck coating material until concrete and air temperature is at or above 40 degrees F. Provide appropriate enclosures and necessary heating for application. Air temperatures directly below and above the slab being coated must be maintained at a minimum of 45 degrees F up to 48 hours prior to coating and at 45 degrees F for a minimum of 72 hours after coating, or as required for full curing of material. Provide high/low thermometers within Work area. As a minimum, provide two thermometers directly below slab and two directly above slab being coated.

E. All deck coating shall maintain straight edges at terminations.

F. Surfaces to be deck coated shall be divided into areas in accordance with the Manufacturer's recommended yield for the specified thickness and for specific container size of material. Area is to be divided by keel marks, or another Engineer approved method.

G. Provide adequate cure time for sealants, minimum 8 hours, to be tack free prior to deck coating. Provide a detail coat at construction joints, control joints, joints at perimeter of patches, cold joints and cracks (sealed and unsealed), minimum of 4 inches wide. Detail coat shall be same thickness as base coat unless Manufacturer's requirements are stricter. Detail coat shall cure a minimum of 12 hours prior to base coating.

H. Extend deck coating up vertical surfaces as indicated on Drawings.

I. Incorporate aggregate until refusal. Aggregate until refusal will result in a surface that is tan in color. Additional aggregate may have to be added after first pass. Seed topcoat with aggregate and backroll.

J. Complete Work under this Section before painting line stripes.

3.5 ADDITIONAL INSTALLATION REQUIREMENTS - RECOAT SYSTEMS

A. Where base concrete is exposed provide primer and base coat.

B. Use primer over entire area as required by Manufacturer.

C. Apply recoat system over areas as specified.

3.6 DAMAGE AND REPAIRS

A. Necessary repairs for deck coating resulting from dry film testing are to be repaired by Installer.

B. Pinholing of deck coating will be cause for rejection. Installer shall repair and take necessary steps to prevent pinholing to occur at no additional expense to Owner.

3.7 CLEANING

A. Remove excess primer, sealant, deck coating, and masking materials from structure.

B. Clean materials installed under this Section according to Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 07 18 00

SECTION 07 92 23 – JOINT SEALANTS FOR PARKING STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes furnishing labor, materials, equipment, and supervision to install joint sealants, including surface preparation.

B. Basis of Contract Payments:
   1. Final contract price (lump sum) shall be adjusted by actual quantities installed at unit prices stated in Contractor's Bid for the following:
      a. Remove and replace cove joint sealants.
   2. Refer to Division 00 Section "Bid Forms."

1.3 SUBMITTALS

A. Action Submittals:
   1. Product Data: Manufacturer's spec data sheets of each product to be used.
   2. Samples:
      a. For each type of joint sealants, including color(s).
      b. Samples may also be requested for chemical analysis.
      c. Sample of Warranty prior to application.
   3. Quality Assurance/Control Submittals:
      a. Complete description of the joint sealant system including primer, sealant material, and backer rods or bond breakers. Also indicate placement and installation procedures along with material working requirements, shelf life, and performance data.
      b. Qualifications of Manufacturer's representative.
      c. Qualification statement of installer stating projects, size and location.

B. Informational Submittals:
   1. Sequence of sealant placement in structure. Coordinate the sealant installation to allow required minimum concrete cure times.
   2. Safety Data Sheets (SDS) of each product, solvent, or related chemicals to be used and certification that materials conform to local, state and federal environmental and worker's safety laws and regulations.
   3. Certification that joint sealant system is compatible with products in Divisions 03 and 07 to which it will come in contact.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Manufacturer and installer are required to confirm that materials used in accordance with this Section conform to local, state, and federal environmental and workers' safety laws and regulations.
   1. VOC content of materials shall not exceed the limits of Environmental Protection Agency National Volatile Organic Compound Emission Standards for Architectural Coatings (40CFR59).

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide a qualified representative to assist installer and Engineer as specified herein. Representative shall be experienced in placement of sealant material.

B. Joint Sealant Installer Qualifications:
   1. Be approved by joint sealant Manufacturer.
   2. Shall have a minimum of 5 years' experience in application of one of approved joint sealant systems and have experience for a project in size of 5,000 LF or greater.

C. Testing Requirements:
   1. Installer shall perform adhesion test in presence of Engineer at rate of 1 test per 1,000 lineal feet of joint. Perform adhesion test a minimum of 7 days after installation. Procedure in accordance with Manufacturer's standard or as follows:
      a. Make a knife cut from one side of joint to other.
      b. Make 2 cuts approximately 2 inches long at sides of joint, meeting first cut at top of 2-inch cuts.
      c. Grasp 2-inch piece of sealant and try to pull uncut sealant out of joint.
      d. If adhesion is adequate, sealant should tear cohesively in itself or be very difficult to adhesively remove from surface.
      e. Sealant shall be replaced by applying more sealant in same manner as original.
   2. If test results are unsatisfactory, perform more frequent testing until satisfactory results are consistently obtained.
   3. Replace sealant which proves defective resulting from above test at no additional cost to Owner.

D. Flow/Leak Test: Arrange for and wet slabs with water for purpose of detecting defects in waterproofing which would result in leaks or inadequate drainage, or both. Wet slab surfaces until water flows freely to drains. Do not install insulation or ceilings in finished spaces until drainage test has been completed on slab above and reviewed by Engineer for acceptance.
   1. Check caulked joints for leaks. Potentially leaking joints are located by noting whether water from flood test is observed at underside of slabs or running down faces of walls. Correct leaking joints by repairing waterproofing.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable. Include the following information:
   1. Name of product.
   2. Name of Manufacturer.
   3. Date of manufacture.
   4. Lot or batch number.
   5. UL labels.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, and damage by weather or elements, and according to Manufacturer's directions.

C. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

D. At no time shall the weight of stored material placed on a slab area exceed 30 PSF or 2,000 lbs. over 20 square inches.

1.7 WARRANTY

A. Provide to Owner a Warranty by Installer and Manufacturer that joint sealant system will be free of defects, water penetration, and chemical damage related to design, workmanship, or material deficiency, consisting of, but not limited to:
   1. Surface crazing or other weathering deficiency.
   2. Abrasion or tear failure resulting from normal traffic use.
   3. Tear failure resulting from anticipated movement.
   4. Debonding from substrate or delaminating between layers.
   5. Defective installation.

B. Warranty shall be "Joint and Several" in which Installer and Manufacturer will jointly and severally warrant and provide at no charge to Owner materials and labor needed to properly repair or replace product and replace parking stripes within duration of Warranty. In event of either party's non-performance, full burden and responsibility for any Warranty repair shall fall upon remaining party.

C. Horizontal Traffic Bearing Applications: Normal traffic is considered to include snow removal equipment with rubber tipped blades as described in the National Parking Association publication, *Parking Garage Maintenance Manual*.

D. Vandalism, abrasive maintenance equipment, and construction traffic are not normal traffic use and are exempt from Warranty.

E. Warranty Duration – Polyurethane and Traffic Bearing Silicone Sealant:
   1. Bid price shall include a 5 year Warranty commencing with date of Project acceptance in accordance with General Conditions.
   2. Although completed areas of facility may be opened to traffic and parking, commencement of Warranty period will not occur prior to acceptance of entire Project.
   3. A single Warranty commencement date will apply to all waterproofing.

F. Warranty Duration – Non-Traffic Bearing Silicone Sealant:
   1. Bid price shall include a 5 year installer Warranty and a 10 year manufacturer Warranty commencing with date of Project acceptance in accordance with General Conditions.
   2. A single Warranty commencement date will apply to all waterproofing.

PART 2 - PRODUCTS

2.1 JOINT SEALANT SYSTEM - MULTI-COMPONENT POLYURETHANE

A. Horizontal Joint Sealant (except cove joints):
   1. Traffic-bearing, multi-component, self-leveling or non-sag unmodified polyurethane sealant, gray in color unless indicated otherwise, containing no coal tar, asphalt, or other adulterants and conforming to ASTM C 920, Standard Specification for Elastomeric Joint Sealants, Type M, Grade P or NS, Class 25, use T and Federal Specification TT-S-00227, Type I or II, Class A.
   2. On slopes greater than 2%, use slope grade versions of specified self-leveling sealants or non-sag sealants, as specified for vertical and cove joint sealants, in accordance with Manufacturer's recommendations.
   3. Approved Horizontal Joint Sealants:
      a. Iso-Flex 880GB or 881, LymTal International, Inc., Orion, MI.
      b. Urexpan NR-200 or Dynatred, Pecora Corp., Harleysville, PA.
      c. Sikaflex - 2c NS/SL, Sika Corp., Lyndhurst, NJ.
      d. MasterSeal SL2, Sonneborn Building Products, BASF Building Systems, Shakopee, MN.
      e. THC-901, Tremco Inc., Cleveland, OH.
      f. Vulkem 445SSL, Tremco Inc., Cleveland, OH.

B. Vertical and Cove Joint Sealants:
   1. Multi-component, non-sag unmodified polyurethane sealant, gray in color unless otherwise noted, containing no coal tar, asphalt, or other adulterants and conforming to ASTM C 920, Type M, Grade NS, Class 25, use NT and Federal Specification TT-S-00227E, Type II, Class A.
   2. Approved Vertical and Cove Joint Sealants:
      a. ISO-FLEX 881, LymTal International, Inc., Orion, MI.
      b. Dynatrol II, Pecora Corp., Harleysville, PA.
      c. Sikaflex - 2c NS, Sika Corp., Lyndhurst, NJ.
      d. MasterSeal NP2, Sonneborn Building Products, BASF Building Systems, Shakopee, MN.
      e. Dymeric 240 FC, Tremco Inc., Cleveland, OH.

2.2 JOINT SEALANT SYSTEM - SILICONE

A. Horizontal-Traffic-Bearing and Vertical Joint Sealant:
   1. Traffic-bearing, single-component, non-sag silicone sealant, gray in color unless otherwise indicated.
   2. Approved Horizontal-Traffic bearing, and Vertical and Cove Joint Sealants:
      a. Dow NS Parking Structure Sealant, Dow Corning, Corp., Midland, MI.
      b. Spectrem 800, Tremco Inc., Cleveland, OH.
      c. Sikasil 728 NS, Sika Corp, Lyndhurst, NJ.
      d. 310-SL, Pecora Corp., Harleysville, PA.

2.3 BACKER ROD

A. Diameter: As recommended by Manufacturer for joint sizes indicated on Drawings.

B. Extruded round, closed cell or bi-cellular, low-density polyethylene or polyolefin foam material with a skin-like outer texture.

C. Approved Closed Cell Backer Rods:
   1. Mile High Foam Backer Rod, Backer Rod Manufacturing, Inc., Denver, CO.
   2. ITP Standard Backer Rod Insulation, Industrial Thermo Polymers Limited, Buffalo, NY.
   3. HBR, Nomaco, Inc., Zebulon, NC.
   4. MasterSeal 920 Closed-Cell Backer-Rod, BASF Building Systems, Shakopee, MN.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect surfaces to receive Work and report immediately in writing to Engineer as required in General Conditions deficiencies in surface which render it unsuitable for proper execution of this Work. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner. Commencement of Work implies acceptance of related Work.

B. Coordinate and verify that related Work meets following requirements.
   1. Concrete surfaces are finished, cleaned and prepped, as specified by Manufacturer for system to be installed.
   2. Curing compounds used on concrete surfaces are compatible with Work to be installed.
   3. Systems selected for use are compatible with each other.

3.2 PREPARATION

A. Grind joint edges smooth and straight prior to installation.

B. Surfaces that are to receive joint sealant shall be dry and thoroughly cleaned by mechanical means of loose particles, existing joint sealant, laitance, dirt, dust, oil, grease or other foreign matter. Use mechanical methods, such as grinding or sandblasting, to clean joint surfaces to sound, virgin concrete.

C. Check preparation of substrate to ensure adhesion of joint sealant.

D. Correct unsatisfactory conditions in a manner acceptable to Manufacturer and Engineer before installation of joint sealant system.

E. Rout cracks with a grinding tool to produce the profile indicated on Drawings. Crack must be centered in the routed notch.

3.3 INSTALLATION/APPLICATION

A. Perform Work in strict accordance with Manufacturer's written instructions and specifications and as indicated on Drawings.

B. Do not apply joint sealant system until concrete has been air dried at temperatures at or above 40 degrees F. for at least 28 days after curing period specified in Division 03 Section “Cast-In-Place Concrete for Parking Structures” or as otherwise approved by Manufacturer.

C. Install bond breaker or backer rod as indicated on Drawings.

D. Prime joints and cracks.

E. Completely fill joint with sealant, without sagging or smearing onto adjacent surfaces.

F. In areas not receiving deck coating, fill horizontal joints and cracks until slightly recessed to avoid direct contact with wheel traffic.

G. Cease installation under adverse weather conditions, or when temperatures are below 40 degrees F or below or above Manufacturer's recommended limitations.

H. Protect joint sealant as required until sealant is fully cured.

3.4 CLEANING

A. Remove excess primer, sealant, and masking materials from structure.

B. Clean materials installed under this Section according to Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 07 92 23

SECTION 07 95 16 – EXPANSION JOINT SYSTEMS FOR PARKING STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes providing and furnishing labor, materials, equipment and supervision to install expansion joint systems.

1.3 SUBMITTALS

A. Certification: Provide each of the following:
   1. Expansion joint system is compatible with products in Divisions 03 and 07 to which it will come in contact.
   2. Certification that materials conform to local, state, and federal environmental and worker's safety laws and regulations.

B. Manufacturer's literature: Spec Data Sheets of each product to be used.

C. Product Data: Provide the following:
   a. Safety Data Sheets of each product, solvent, or related chemicals to be used.
   b. Description of expansion joint sealant system along with pertinent test and design data.
   c. Temperature vs. joint width installation chart.
   d. Preventive maintenance guideline for parking structure expansion joints.
   e. "Snow Removal Guidelines" stating procedures Owner is to follow during snow removal over expansion joints.
   f. For review and approval prior to installation proposed Warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer’s/Installer’s Requirements:
   1. Installer shall be approved by expansion joint Manufacturer. Installer shall be a licensed Installer, factory trained and certified in proper installation.
   2. Installer shall have a minimum of 5 years experience in application of one of the approved expansion joint systems and have experience for a project in size of 600 Lineal Feet or greater.
   3. Repair existing expansion joints in accordance with the Drawings and Manufacturer's recommendations. The new materials used shall be compatible with existing and approved by the Manufacturer.

B. Flood Test: Arrange for and wet slabs with water to detect defects in waterproofing which would result in leaks. Wet down slab surfaces until water flows freely to drains. No finished spaces shall be insulated or ceiling installed until drainage test has been completed on slab above and reviewed by Engineer for acceptance.
   1. Potentially leaking expansion joints are located by noting whether water from flood test is observed at underside of slabs or running down faces of walls. Correct leaking joints by repairing waterproofing.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Confirm that materials used in accordance with this Section conform to local, state, and federal environmental and workers' safety laws and regulations.

1.6 DELIVERY, STORAGE AND HANDLING

A. Ship in weather-proof enclosures, in weather-proof containers or in weatherproofing packaging. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable. Include the following:
   1. Name of product.
   2. Name of Manufacturer.
   3. Date of Manufacturer.
   4. Lot or batch number.
   5. UL labels.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, and damage by weather or elements, and according to Manufacturer's directions.

C. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

D. At no time shall weight of stored material placed on a slab area exceed design loads.

1.7 WARRANTY

A. Requirements:
   1. Provide a Warranty from Installer and Manufacturer that expansion joint system will be free of leaks and defects related to design, workmanship, or material deficiency for duration of Warranty.
   2. Warranty shall be "Joint and Several" in which Installer and Manufacturer will jointly and severally warrant and provide at no charge to Owner materials and labor needed to properly repair or replace product within duration of Warranty. In event of either party's non-performance, full burden and responsibility for Warranty repair shall fall upon remaining party.
   3. Vandalism, abrasive maintenance equipment, and construction traffic are not normal traffic use and are exempt from Warranty.
   4. Normal traffic is considered to include snow removal equipment with rubber-tipped blades as described in the National Parking Association publication, "Parking Garage Maintenance Manual."

B. Warranty Duration:
   1. Bid price shall include a 5 year Warranty commencing with date of project acceptance in accordance with the General Conditions, and Division 01 Section “Closeout Procedures”.
   2. Although completed areas of facility may be opened to traffic and parking, commencement of Warranty period will not occur prior to acceptance of entire project.
   3. A single Warranty commencement date will apply to waterproofing.

PART 2 - PRODUCTS

2.1 EXPANSION JOINTS

A. Systems and glands to accept pedestrian traffic are to comply with Americans with Disabilities Act (ADA) guidelines.

B. For each type of expansion joint, the same Manufacturer's system shall be used throughout.

C. Design of Expansion Joint System: For a maximum ambient temperature range of -30 degrees F to +120 degrees F.

2.2 EXPANSION JOINT SYSTEM - MULTICELL GLAND/AMBIENT CURED NOSING (WINGED SEAL)

A. Capable of bearing vehicular traffic while maintaining a watertight seal. Expansion joint shall be capable of cyclic movement expected at joint without overstress in gland or nosing material.

B. Elastomeric membrane shall be a multicell extruded shape gland with integral perforated side flanges made from Santoprene thermoplastic rubber.

C. Nosing material shall be ambient cured, elastomeric, 100% solids, two-component urethane resin plus sand mixture.

D. Provide preformed or fabricated wall mount plates with appropriate anchors and sealants.

E. Approved Elastomeric Membrane with Ambient Cured Urethane Nosing Expansion Joint System for Vehicular Traffic are:
1. Thermaflex TCR Membrane Nosing System (Model No. TCR-400), Emseal Joint Systems, LTD, Westborough, MA.
2. Polycrete/Membrane CR-Series System (Model No. CR-400), Erie Metals Specialties, Inc., Akron, NY.
3. Iso-Flex Winged Expansion Joint Sealing System (Model No. J40), LymTal International, Inc., Orion, MI.
4. WaboCrete II/Membrane 201 Expansion Joint System (Model No. ME-400), Watson Bowman Acme Corp., Amherst, NY.
5. MM Lokcrete Membrane Expansion Joint System (Model No. LMS-450 HD), MM Systems Corp., Pendergrass, GA.
6. Vulkem WF Vehicular Expansion Joint System (Model Nos. WF-400), RPM Co., Cleveland, OH.

2.3 EXPANSION JOINT SYSTEM - NOSING (WINGED SEAL)

A. Nosing material shall be ambient cured, elastomeric, 100% solids, two-component urethane resin plus sand mixture.

B. Approved Strip Seal Expansion Joint Nosing Materials:
1. Emcrete, Emseal Joint Systems, LTD, Westborough, MA.
2. Polycrete 1600, Erie Metals Specialties, Inc., Akron, NY.
3. Iso-Flex 900, LymTal International, Inc., Orion, MI.
4. WaboCrete II, Watson Bowman Acme Corp., Amherst, NY.
5. LokCrete, MM Systems Corp., Pendergrass, GA.
6. Vulkem WF1600, RPM Co., Cleveland, OH.

PART 3 - EXECUTION

3.1 INSPECTION AND COORDINATION

A. Inspect surfaces to receive Work and report immediately in writing to Engineer as required in General Conditions deficiencies in surface which render it unsuitable for proper execution of this Work. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner. Commencement of Work implies acceptance of related Work.

B. Coordinate and verify that related Work meets following requirements:
1. Concrete surfaces are finished, cleaned, and prepared, as specified by Manufacturer.
2. Curing compounds used are compatible or have been removed.
3. Concrete surfaces have completed proper curing period.
4. Systems are compatible with each other.

C. Take necessary precautions to protect building occupants during installation.

D. Use protective equipment and area shall be well vented to outside.

E. Prior to ordering material, remove existing joint system to measure size of gap and review this information with Manufacturer and Engineer to determine the proper gland size. Temporarily cover joints if located in pedestrian area until new system is installed.

3.2 PREPARATION

A. Provide a properly formed, solid, straight, parallel concrete blockout in accordance with Manufacturer's requirements and as indicated on Drawings.

B. Grind joint edges smooth and straight prior to installation.

C. Abrasive blast expansion joint blockout to receive bonded nosing material. Remove contaminates, including laitance. Expose fine aggregate, however, do not expose coarse aggregate.

D. Thoroughly dry and clean surfaces of loose particles, laitance, dirt, dust, oil, grease, or other foreign matter.

E. Expansion joint blockouts requiring widening or other necessary modifications shall be incidental to system cost.

F. Actual field conditions of existing expansion joint blockouts may be deeper and wider than proposed new expansion joint system as detailed on Drawings. Blockout size may not be reduced by patching, shimming, etc. When existing blockout is larger additional nosing material shall be used. When blockout size is smaller it shall be made larger by sawcutting.

3.3 INSTALLATION/APPLICATION

A. Install Work in strict accordance with Manufacturer's written instructions, indicated herein and as indicated on Drawings.

B. Do not install expansion joint systems until concrete has been air dried at temperatures at or above 45 degrees F for at least 28 days after the curing period specified in Division 03 Section “Cast-In-Place Concrete for Parking Structures,” or as otherwise acceptable by Manufacturer. Blockouts requiring use of patching compounds must be cured for 72 hours prior to installation.

C. Cease installation of expansion joints under adverse weather conditions, or when temperatures are below or above Manufacturer's recommended limitations for installation.

D. Mask adjacent concrete and gland surfaces to provide neat, workmanlike appearance.

E. Unpack membrane seal or gland and lay in a relaxed position to relieve temporary coiling from shipment prior to installation.

F. Ambient Temperatures: Not be lower than 40 degrees F during installation.

G. Terminations of joints shall have a minimum upturn of 6 inches.

3.4 ADDITIONAL INSTALLATION REQUIREMENTS - MULTICELL GLANDS (WINGED SEAL)

A. Use heat methods for field splicing of glands and only by prior approval of Manufacturer and Engineer.

B. Miter, splice and terminate glands as indicated on Drawings. Directional change miters such as 90 degree corners, tees, and provide crosses with factory heat-welded splices. Straight butt splice connections are allowed on Site following Manufacturer's written instructions utilizing specialty heat fusing equipment or Manufacturer's specialty splicing adhesive.

C. Maximum horizontal and vertical alignment tolerance of nosings and glands shall be 1/16-inch.

3.5 ADDITIONAL INSTALLATION REQUIREMENTS – NOSING (WINGED SEAL)

A. Maximum horizontal and vertical alignment tolerance of nosings and glands shall be 1/16 inch.

3.6 CLEANING

A. Remove excess primer, nosing material, and masking materials, and dispose of in a proper manner.

B. Clean materials installed under this Section according to Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 07 95 16

SECTION 09 91 33 – RESTORATION PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes providing and furnishing permits, labor, materials, equipment, and services to prepare and paint and stain as indicated on the Drawings. Provide for the following:
   1. Stain/paint concrete repairs to match existing.
   2. Paint precast connections.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. American Society for Testing and Materials (ASTM) Standards, as cited herein.
   2. Steel Structures Painting Council (SSPC), Volume I, Good Painting Practices and Volume II, Systems and Specifications.
   3. Local, state, or federal laws and regulations governing Volatile Organic Compounds (VOC) in paint or paint products.

1.4 SUBMITTALS

A. Manufacturer’s literature: Submit for review and approval:
   1. Manufacturer's "Spec Data Sheets for paint systems; including primer, intermediate, and final coats.
   2. Safety Data Sheets (SDS) for each type of material used.
   3. Submit complete preparation and painting procedure to be followed. As a minimum, the following items must be included:
      a. Surface preparation.
      b. Paint mixing and application.
      c. Inspection criteria.
      d. Paint characteristics.
      e. Dust and fume control.
      f. Storage and handling.
      g. Repair to paint system.
      h. Paint curing.
      i. Compatibility of each component.
   4. Manufacturer's standard color chart.

B. Certifications: Submit for review and approval for each of the following:
   1. Submit compliance with local and federal guidelines governing paint application.
   2. Submit verification that proper permits have been obtained for contemplated work.
   3. Submit for record test results of actual measured wet and dry film thicknesses and certification that the preparation and application of surfaces is in compliance with this specification and the Manufacturer's specification. Indicate the following:
      a. Location.
      b. Date.
      c. Weather and other pertinent information.
   4. For record results of adhesion tests.

C. Samples: Submit for review and approval:
   1. Sample color chips for each topcoat color. Samples are to measure 12-inches x 12-inches, are to be on hardboard, and to have a texture to simulate actual conditions.

1.5 QUALITY ASSURANCE

A. Provide coating systems produced by the same Manufacturer.

B. Check membrane wet film thickness by making a test consisting of 5 wet film readings within a 1 square foot area. The average film thickness shall be within 10 percent minus or 30 percent plus of the Manufacturer's recommended average wet film thickness. No individual reading shall be more than ±50 percent of the manufacturer's recommended wet film thickness. The number of wet film thickness tests for each coat are as follows:
   1. Concrete: Two tests for every 500 sf.
   2. If thickness check fails the above requirements, more frequent testing will be required as directed by the Engineer.

C. Test coating systems to be applied over an existing paint system for adhesion using a cross hatch adhesion test in accordance with ASTM D3359, Method B, not less than a 4B rating or Elcometer adhesion testing in accordance with ASTM D4541 not less than 1000 psi pull, average of 3 tests.

D. Manufacturer shall review locations where there is an existing paint/stain system to determine if their system is compatible with the existing system.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Confirm that materials used in accordance with this Section conform to local, state, and federal environmental and workers' safety laws and regulations.

B. Provide necessary containment to protect on Site and adjoining property from damage during cleaning and coating operations.

C. Meet regulations regarding air quality emission standards, OSHA, NFPA, EPA and other governing law set by local, state, and federal agencies.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, and damage by weather or elements, and according to Manufacturer's directions.
   1. Mix and prepare coatings only in areas designated for that purpose.
   2. Provide clean cans and buckets required for mixing coatings and for receiving rags and other waste materials associated with painting. Clean buckets regularly. At the close of each day's work remove used rags and other waste materials associated with painting.
   3. Take precautions to prevent fire in or around coatings materials. Provide and maintain hand fire extinguisher near storage and mixing area.

C. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 STEEL COATING SYSTEM – PRECAST CONNECTIONS

A. Provide coating system consisting of zinc prime coat and urethane finish coat 2-3 mil dry film thickness in accordance with Manufacturer's recommendations.

B. Provide prime coat and finish coat from same Manufacturer and of a different color.

C. Prime coat is only required at bare steel.

D. Approved Paint Systems:
   1. PPG Industries System:
      a. Zinc Primer: Aquapon 97-670 Series.
      b. Urethane: 95-812 Series Pitthane Ultra.
   2. Or approved equal.

2.2 CONCRETE STAIN SYSTEM

A. Provide system consisting of 2 coats of a (white) water-base penetrating stain in accordance with Manufacturer's recommendations.

B. Approved Stain Systems:
   1. CanyonTone Stain, United Coatings (GAF).
   2. H & C COLORTOP Water-Based Solid Color Concrete Stain, H&C Products Group (Sherwin Williams).
   3. Series 617 Conformal Stain WB, Tnemec Industrial Coatings.
   4. Or approved equal.

2.3 CONCRETE PAINT SYSTEM

A. Provide system designed for concrete applications of a primer and urethane finish coat.

B. Provide primer and finish coat from same Manufacturer.

C. Color of finish coat shall match existing.

D. Approved Paint Systems:
   1. Carboline Company Paint System:
      a. Primer: As recommended by Manufacturer.
      b. Finish Coat: Carbothane 134 HS. One coat to a dry mil thickness 2-3 mils.
   2. PPG Industries Paint System:
      a. Primer: As recommended by Manufacturer.
      b. Finish Coat: 95-800 Series-Pitthane Acrylic Urethane. One coat to a dry mil thickness 1.5-2 mils.
   3. Tnemec Paint System:
      a. Primer: As recommended by Manufacturer.
      b. Finish Coat: Endura-Shield 73 Series. One coat to a dry mil thickness 2 mils.
   4. Sherwin Williams Paint System:
      a. Primer: As recommended by Manufacturer.
      b. Finish Coat: Pro Industrial Urethane Alkyd Enamel. One coat to dry mil thickness 2 mils.
   5. Or approved equal.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Inspect surfaces to which paint will be applied and send a report to the Engineer of detrimental conditions in accordance with the General Conditions to the proper execution of this work.

B. Do not proceed until unsatisfactory conditions are acceptably remedied. Commencement of work implies acceptance of related work.

C. Do not apply coating system without the approval of the Engineer as to the proposed method of the surface preparation.

D. Before commencing work, make certain that the surface is in proper condition to receive coating system, that surfaces are clean, dry, smooth, and at proper temperature as recommended by Manufacturer.

E. Provide adequate ventilation to remove fumes to a safe location and to confine and control fumes so that life or property is not endangered.

F. Protect adjacent surfaces, vehicles and equipment from overspray.

G. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

H. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.

3.2 PREPARATION

A. Mask boundaries to provide straight edges.

B. Do not intermix materials of different character or different Manufacturer.

C. Do not thin material except as recommended by Manufacturer.

D. Remove hardware, covers, plates, signs, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

E. Preparation of Corroded Metal Surfaces:
   1. Corroded steel shall be abrasive blast cleaned in accordance with Steel Structures Painting Council surface preparation specification SSPG SP10 - White Metal. Provide a blast profile as recommended by the paint manufacturer. The Contractor shall measure the blast profile using Testex Replica Tape.
   2. After blasting and before painting, brush the surface with clean brushes made of fiber or bristle, or cleaned by vacuum, removing traces of blast products from the surface as well as corners and pockets.
   3. The blast cleaning operations shall be done in such a manner that no damage is done to partially or entirely completed portions of the work.
   4. Dry blast cleaning operations shall not be conducted on surfaces that will be wet after blasting and before painting or when the surfaces are less than 5 degrees F. above the dew point, or when the relative humidity of the air is greater than 85 percent, unless a water-tolerating inhibitive treatment or coating will be applied before rusting occurs.
   5. Apply primer within 8 hours of surface preparation.

F. Preparation of Non-corroded Metal Surfaces:
   1. Remove all loose paint.
   2. Clean and dry surfaces, ensure surface is free of all contaminants such as dirt, dust, laitance, grease, and other contaminants that would interfere with the adhesion of the specified coating system.

G. Preparation of coated and uncoated concrete surfaces:
   1. Clean by power washing and dry surfaces, ensure surface is free of contaminants such as dirt, dust, laitance, grease, previously applied coatings and other contaminants that would interfere with the adhesion of the specified coating system.
   2. Properly prepared surfaces shall be dry prior to coating.
   3. New concrete shall cure for minimum of 28 days prior to coating, or as required by Manufacturer.
   4. Determine alkalinity and moisture content of surfaces to be coated by performing appropriate tests. If surfaces are found to be unsuitable for painting, correct this condition prior to painting. Do not paint surfaces with moisture contents exceeding Manufacturer's limits.

3.3 APPLICATION

A. Work shall be done by skilled craftsmen who are qualified to perform the required work and shall be done in a manner comparable to the best standards of practice found in that trade. Apply material evenly applied so as to be free from sags, runs, crawls, wrinkles, holidays, or any other application defects. Brushed coats shall be of the proper consistency and properly brushed out so as to show the minimum of brush marks. When finished and dried, brush strokes shall appear in the vertical direction only, and there shall be no curved brush marks showing. Ensure each coat is thoroughly dry before the succeeding coat is applied.

B. In applying coatings by spray gun, the material shall be applied in a wet coating that remains glossy wet for at least 20 seconds after application. Spraying shall be done in the crisscross lap method of spraying, striking first in one direction and shortly thereafter spraying across this same section at right angles to the first set of passes, so as to provide a continuous wet film of the finish coat.

C. Apply paint in accordance with the Manufacturer's printed instructions for that particular coating.

D. Where more than 2 coats are specified, each subsequent coat shall be of sufficient color difference that holidays, skips, thin spots, etc. can be easily be seen in contrast with the preceding coat.

E. The base coating shall be applied within 8 hours after the final abrasive blasting.

3.4 REPAIR

A. Repair paint damage by the re-application of the paint system in accordance with the Manufacturer's recommendations.

B. Apply additional coats if the coating does not completely hide the undercoat.

END OF SECTION 09 91 33

SECTION 22 14 00 – STORMWATER PLUMBING FOR PARKING STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes furnishing permits, labor, materials, fabrication, and installation for the replacement of the existing floor drains.

B. Complete work necessary to meet the building codes. If there are changes in the Drawings and Specifications be required to comply, notify the Engineer.

C. Basis of Contract Payments:
   1. Final contract price (lump sum) shall be adjusted by actual quantities installed at unit prices stated in Contractor's Bid for the following:
      a. Remove and replace floor drains.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASME.
   2. ANSI.
   3. ASTM.
   4. Local Building Codes and latest requirements.

1.4 QUALITY ASSURANCE

A. Test the storm drain system under normal conditions of use in accordance with the requirements of the authorities having jurisdiction.

B. Provide instruments for making the tests.

C. Test parts of the system in the presence of the General Contractor and Engineer, for a sufficient period of time to permit a complete examination and inspection.

D. Remedy defects in materials or workmanship which appear during the test and retest the system.

1.5 SUBMITTALS

A. Manufacturer’s literature: Submit Spec. Data Sheets.

B. Shop Drawings: Submit for review indicating the following:
   1. For each location:
      a. Floor drains.
      b. Cleanouts.
      c. Plumbing line layout.
      d. Plumbing line supports.
      e. Pipes.
   2. Prepare drawings indicating location of ponding and condition of each existing floor drain.

C. Testing: Submit results of storm drain system testing.

1.6 DELIVERY, STORAGE AND HANDLING

A. Ship in weather-proof enclosures, in weather-proof containers or in weatherproofing packaging. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, and damage by weather or elements, and according to Manufacturer's directions.

C. Reject damaged, deteriorated, or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 PIPE

A. PVC Schedule 80, ASTM D1784 and ASTM D1785, match diameter of existing piping.

2.2 FLOOR DRAINS

A. Provide heavy duty galvanized 12-inch diameter floor drains with sediment buckets and heel-proof, vehicular grate.

B. Acceptable heavy duty materials are:
1. 2140, Jay R. Smith, Montgomery, AL.
2. 1200, Wade, Tyler, TX.
3. Z509, Zurn, Erie, PA.
4. Or approved equal.

C. Provide connection hardware as required to complete installation and as indicated on the Drawings.

2.3 CLEANOUTS

A. PVC Schedule 80, ASTM D2464 and ASTM D2467.

2.4 HANGERS

A. Adjustable malleable galvanized hangers of clevis type with adjustable galvanized steel rods.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect area to receive the work and report unacceptable conditions immediately in writing to the Engineer, as required in the General Conditions. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner. Commencement of erection implies acceptance of related work.

3.2 PREPARATION

A. Take out necessary permits, arrange for the required inspections and pay fees and expenses associated with performing the Mechanical Work.

B. Locate objects suspended below ceiling, embedded electrical conduit and reinforcement. Offset cored holes to miss existing items. Approval from the Engineer is required for offset dimensions prior to coring.

C. Before starting Work, prepare and submit a schedule of operations outlining the proposed order of procedure giving the dates of execution and the estimated time required for the completion of each step.

D. Verify dimensions in the field.

E. Verify ceiling heights or other architectural and structural details before installing piping.

3.3 INSTALLATION

A. Cut openings in the slabs as required to install new floor drains.

B. Install piping parallel to building walls and column lines, maintaining clear height as to not interfere with doorways, stairway, or traffic, while keeping a neat appearance.

C. Install piping so as to occupy a minimum of space, close to walls, ceiling, columns, or other members providing proper space for covering or removal of pipes.

D. Work pipe into place without springing.

E. Install piping such that it will drain and vent as indicated on the Drawings or required. Pitch horizontal lines 1/8-inch per foot minimum at a uniform grade.

F. Connect piping to existing drain system.

G. Properly support piping installed on suitable pipe hangers and supports. Fabricate the equipment for permanent hangers, supports, and anchors from durable materials suitable for the service conditions and in accordance with the Drawings.

H. Base is required strength of hangers on the combined weight of the piping filled with water.

3.4 CLEANUP

A. At the completion of Work under this Contract, remove the rubbish and accumulated materials from the building in accordance with Division 01 Section “Cleaning and Waste Management.”

B. Provide the entire installation thoroughly free from oil and grease after successfully completing tests and before the Work is turned over to the Owner.

END OF SECTION 22 14 00