CONTRACT DOCUMENTS

FOR

SOPERS MILL ROAD CROSSING

AUBURN, MAINE

May 2017

Tony Beaulieu P.E *City Engineer*
Derek Boulanger, *Facilities Manager/Purchasing Agent*

City of Auburn, Maine

"Maine's City of Opportunity"

Financial Services

May 8, 2017

Dear Bidder:

The City of Auburn is accepting written proposals for the Auburn Public Services Department's **Sopers Mill Road Crossing.** The City reserves the right to accept or reject any or all proposals in whole or in part and to waive any informality the City may determine necessary. The City also reserves to itself the exclusive right to accept any proposal when it is deemed by the City to be in its best interest. The City of Auburn is governed by Title 1 M.R.S.A. § 401-410, otherwise known as the Freedom of Information Act, which considers bid specifications as public documents. In awarding any proposal, the City may consider, but not be limited to, any of the following factors: Bidder qualifications, price, experience, financial standing with the City, warranties, references, bonding, delivery date, and service of Bidder. Vendors/Contractors shall be current on all amounts due to the City of Auburn prior to the City entering into any contract agreement. All proposals must include FOB to Auburn, Maine unless otherwise specified.

Proposals will not receive consideration unless submitted in accordance with the following instructions to bidders. Please mark sealed envelopes plainly: **"Sopers Mill Road Crossing – Bid #2017-024.**

Bid packages will be available beginning on Monday, May 8, 2017. Documents can be obtained from the City of Auburn's website: www.auburnmaine.gov/business/bid-notices. Questions regarding this Request for Bids should be directed to Tony Beaulieu P.E, City Engineer, at (207) 333-6601, ext. 1140. **A mandatory pre-bid will be held on Tuesday, May 16, 2017, at 2:00 PM in the Community Room, Auburn City Hall.**

Please submit your proposal to the City of Auburn by 2:00 p.m. **Thursday, May 25, 2017.** Proposals must be delivered to **Derek Boulanger, Facilities Manager/Purchasing Agent, 60 Court Street, Auburn, Maine 04210** on or before the date and time appointed. No proposals will be accepted after the time and date listed above. Proposals will be opened at 2:00 p.m. on that date in Community Room, Auburn City Hall.

Sincerely,

Derek Boulanger
Facilities Manager/Purchasing Agent

60 Court Street • Suite 114 • Auburn, ME 04210
(207) 333-6600 Voice • (207) 333-6601 Automated • (207) 333-6620 Fax

TABLE OF CONTENTS

CONDITIONS AND INSTRUCTIONS TO BIDDERS

1. Bidders shall use the enclosed bid form for quotations. Whenever, in bid forms, an article is defined by using a trade name or catalog number, the term "or approved equal", if not inserted, shall be implied.

2. Submit a separate unit price for each item unless otherwise specified in the bid request. Award will be made on a basis of each item, or as a group, whichever is in the best interest of the City. Prices stated are to be "delivered to destination".

3. Bid proposals must be completed in full, in ink and must be signed by firm official. Bid proposal **must be notarized** prior to bid being sealed and will be disqualified if not notarized. Bids may be withdrawn prior to the time set for the official opening

4. Bids will be opened publicly. Bidders or representatives may be present at bid opening.

5. Awards will be made to the lowest responsible bidder, considering the quality of the materials, date of delivery, cost which meets specification and is in the best interest to the City of Auburn.

6. All transportation charges, including expense for freight, transfer express, mail, etc. shall be prepaid and be at the expense of the vendor unless otherwise specified in the bid.

7. The terms and cash discounts shall be specified. Time, in connection with discount offered, will be computed from date of delivery at destination after final inspection and acceptance or from date of correct invoice, whichever is later.

8. The City is exempt from payment of Federal Excise Taxes on the articles not for resale, Federal Transportation Tax on all shipments and Maine Sales Tax and Use Taxes. Please quote less these taxes. Upon application, exemption certificate will be furnished with the Purchase Order when required.

9. No contract may be assigned without the written consent of the Purchasing Director or his designate. The contract shall not be considered valid until a purchase order has been issued to the successful bidder.

10. Please state "Sopers Mill Road Crossing – Bid # 2017-024", on submitted, sealed envelope.

11. The City of Auburn reserves the right to waive any formality and technicality in bids whichever is deemed best for the interest of the City of Auburn.

12. All work must be completed from 7:00AM to 6:00PM. All in-stream water work must be completed between July 15, 2017 and September 30, 2017. The completion date for this project is September 30, 2017. Liquidated damages of $500/calendar day will be assessed on uncompleted work.

GENERAL CONDITIONS

1. Equal Employment Opportunity

The City of Auburn is an Equal Opportunity Employer and shall not discriminate against an applicant for employment, and employee or a citizen because of race, color, sex, marital status, physical and/or mental handicap, religion, age, ancestry or natural origin, unless based upon a bona-fide occupation qualification. Vendors and contractor or their agents doing business with the City shall not violate the above clause or the Civil Rights Acts of 1964. Violations by vendors shall be reviewed on a case-by-case basis and may mean an automatic breach of contract or service to the City of Auburn.

2. Save Harmless

The Bidder agrees to protect and save harmless the owner from all costs, expenses or damages that may arise out of alleged infringement of patents of materials used.

3. Subcontracting

The Bidder shall not subcontract any part of the work or materials or assign any monies due it without first obtaining the written consent of the municipality. Neither party shall assign or transfer its interest in the contract without the written consent of the other party.

4. Warranty

The Bidder warrants that all work will be of good quality and free from faults and defects, and in conformance with the specifications. All work not so conforming to these standards may be considered defective. The Bidder agrees to be responsible for the acts and omissions of all of its employees and all subcontractors, their agents and employees, and all other persons performing any of the work under a contract with the Bidder.

5. Bonds, Retainage and Payments

A bid bond shall be submitted with appropriate bid forms in the amount of 5% of the total contract value. Also, payment and performance bonds will be required from the contractor who is awarded this contract. Retainage in the amount of 10% will be held from each progress payment and shall be released at the discretion of the Project Engineer. Payments shall be made by the City to the Contractor 30 days after receipt of the request for payment.

BID PROPOSAL FORM

Due: Thursday, Ma7 25, 2017

To: City of Auburn
Derek Boulanger, Facilities Manager/Purchasing Agent
60 Court Street
Auburn, ME 04210

The undersigned individual/firm/business guarantees this price for Thirty days (30) from the bid due date. The undersigned submits this proposal without collusion with any other person, individual, or firm or agency. The undersigned ensures the authority to act on behalf of the corporation, partnership or individual they represent; and has read and agreed to all of the terms, requests, or conditions written herein by the City of Auburn, Maine. By signing this bid form, the firm listed below hereby affirms that its bid meets the minimum specifications and standards as listed above.

Signature _____Name (print) _____

Title_____Company_____

Address_____

Telephone No._____Fax No. _____

Email Address:_____

STATE OF MAINE
_____, SS. Date: _____

Personally appeared and acknowledged the foregoing instrument to be his/her free act and deed in his/her capacity and the free act and deed of said company.

Notary Public_____

Print Name_____
Commission Expires_____

Addendum Acknowledged:
#_____Date_____
#_____Date_____
#_____Date_____

City of Auburn

Sopers Mill Road Crossing Base Bid Form

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
1	Rehabilitation of Sopers Mill Road Crossing	LS	1		
2	Type 'A' Minor Concrete Spall Repair	SF	325		
3	Type 'B' Moderate Concrete Spall Repair	SF	180		
4	Type 'C' Major Concrete Spall Repair	SF	75		
5	Type 'D' Wall Cap Repair	SF	32		
6	Type 'E' Minor Footing Repair	LF	18		
7	Type 'F' Major Footing Repair	LF	58		
8	Type 'G' 12" I-Beam Painting Repair	LS	1		
TOTAL AMOUNT OF BASE BID WRITTEN AND IN NUMBERS BASED ON ESTIMATE OF QUANTITIES					
(Written)					

City of Auburn

Sopers Mill Road Crossing Bid Alternate Form

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
A	Lead Paint Abatement	LS	1		
TOTAL AMOUNT OF BID ALTERNATE WRITTEN AND IN NUMBERS BASED ON ESTIMATE OF QUANTITIES					
(Written)					

BASIS OF AWARD BID FORM SOUTH MAIN STREET ROADWAY RECONSTRUCTION PROJECT AUBURN, MAINE	
Sopers Mill Road Crossing Base Bid Written in Numbers	$
Sopers Mill Road Crossing Bid Alternate Written in Numbers	$
TOTAL: BASIS OF AWARD (Base Bid + Bid Alternate)	**$**

Company Name: _____

Signed by: _____

Title: _____

Print Name: _____

Address: _____

Tel. # _____Fax # _____

Date: _____

BID BOND

KNOW ALL BY THESE PRESENTS, that we, the undersigned, _____as Principal, and _____ as Surety, are hereby held and firmly bound unto _____as OWNER in the penal sum of _____for payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____day of _____, 2016.

The Condition of the above obligation is such that whereas the principal has submitted to _____a certain BID,

attached hereto and hereby made a part hereof to enter into a contract in writing, for the _____

NOW, THEREFORE,

(a) If said BID shall be rejected, or

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for all and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ (L.S)
Principal

Surety

By:_____

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

SAMPLE AGREEMENT

THIS AGREEMENT is made this ### day of Month Year, by and between the CITY OF AUBURN, a municipal corporation existing under the laws of the State of Maine and located in the County of Androscoggin, State of Maine (hereinafter "CITY"), Company Name, Address, EIN, (hereinafter "CONTRACTOR"),

WITNESSETH:
In consideration of the mutual covenants and conditions contained herein, the CITY and the CONTRACTOR agree as follows:

SPECIFICATIONS:

1. The CONTRACTOR shall furnish all of the material and perform all of the work shown on the drawings and described in the specifications entitled: Bid # XXXXX Bid Title
which are attached hereto and made a part hereof, and the CONTRACTOR covenants that it shall do everything required by this Agreement, the Special Provisions of the Agreement, the Invitation to Bid and the Specifications in return for payment as provided herein.

COMPLETION DATE:

2. The work to be performed under this Agreement shall be commenced by Month day, year and fully completed on or before Month day, year.

CONTRACT PRICE:

3. The CITY shall pay the CONTRACTOR for the performance of the Agreement the sum of $XXX

PERFORMANCE BOND:

4. If required by the City, the CONTRACTOR shall furnish to the CITY at the time of the execution of this Agreement a performance bond and a labor and material payment bond each in the amount of $Dollar amount or N/A (whichever applies) executed by a surety company satisfactory to the CITY, guaranteeing the performance and payment by the CONTRACTOR. ❑ Yes, Required (Initials: ____) ❑ No, Waived (Initials ___)

GUARANTEE:

5. The CONTRACTOR shall guarantee his work against any defects in workmanship and materials for a period of one year from the date of the CITY's written acceptance of the project.

PERMITS AND LICENSES:

6. Permits and licenses necessary for the prosecution of the work shall be secured and paid by the CONTRACTOR.

CITY'S RIGHT TO TERMINATE CONTRACT:

7. If the CONTRACTOR should be adjudged a bankrupt, or if it should make a general assignment for the benefit of creditors, or if a receiver should be appointed on account of its insolvency, or if it should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or if it should fail to make prompt payment to subcontractors or for material or labor, or persistently disregard laws, and ordinances, or otherwise be guilty of a substantial violation of any provision of the Agreement, then the CITY when sufficient cause exists to justify such action, may, without prejudice to any other right or remedy and after giving the CONTRACTOR, and his surety, seven (7) days written notice, terminate the employment of the CONTRACTOR and take possession of the premises and of all materials, tools and appliances thereon and finish the work by whatever method it may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Agreement price shall exceed the expense of the finishing the work, including compensation for additional architectural, managerial and administrative services, such excess shall be paid to the CONTRACTOR. If such expense shall exceed such unpaid balance, the CONTRACTOR shall pay the difference to the CITY.

CONTRACTOR'S LIABILITY INSURANCE:

8.The CONTRACTOR shall not commence work under this Agreement until he has obtained all insurance required under this paragraph and such insurance has been approved by the CITY, nor shall the CONTRACTOR allow any subcontractor to commence work on his subcontract until all similar insurance required of subcontractor has been so obtained and approved. It is a requirement that the CITY be named as an Additional Insured on the General Liability and Automobile Liability policies.

Commercial General Liability to include products and completed operations, and blanket contractual. The limits of liability shall be as follows:

Bodily Injury and Property Damage	$1,000,000
Personal Injury and Advertising Injury	$1,000,000
Per Project Aggregate	$1,000,000
General Aggregate	$2,000,000
Products and Completed Operations Aggregate	$2,000,000
Medical Payments	$10,000

(b) Business Automobile Liability

The CONTRACTOR shall maintain and cause all sub-contractors and lower tier contractors to maintain business automobile liability insurance covering all owned non-owned, leased, rented or hired automobiles (symbol 1). The limits of liability shall be as follows:

Bodily Injury and Property Damage	$1,000,000

Automobile physical damage coverage shall be at the option of the CONTRACTOR, all sub-contractors and lower tier contractors. The CITY shall not be liable for physical loss or damage to any owned, non-owned, leased, rented or hired automobile.

Workers' Compensation Insurance

The CONTRACTOR shall maintain and cause all sub-contractors and lower tier contractor's to maintain Workers' Compensation and Employers Liability in accordance with the laws and regulations of the State of Maine. The limits of liability provided shall be as follows:

Coverage A:	Statutory
Coverage B:	$100,000/$500,000/$100,000

Professional Liability

If the CONTRACTOR is an Architect, Engineer or Surveyor, they shall maintain a policy of insurance to pay on their behalf whatever amounts that may become legally required to pay on account of an error, omission or negligent act.

Limits of Liability shall be as follows:

$1,000,000 per occurrence and in the aggregate site specific.

It is a requirement that this policy be maintained for a period of three (3) years following completion of the project.

Certificates of Insurance of the types and in the amounts required shall be delivered to the CITY prior to the commencement of any work by the CONTRACTOR, subcontractor or lower tier contractor or any person or entity working at the direction or under control of the CONTRACTOR. The CONTRACTOR shall assume the obligation and responsibility to confirm insurance coverage for all sub-contractors or lower tier contractors who will participate in the project.

The Certificate of Insurance and the policies of insurance shall include a sixty (60) day notice to the CITY of cancellation, non-renewal or material change in coverage or form.

The CONTRACTOR and his surety shall indemnify and save harmless the CITY, his officers and employees from all suits, actions or claims of any character brought because of any injuries or damage received or sustained by any person, persons or property on account of the operations of the said CONTRACTOR; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in construction of the work; or because of any act or omission, neglect, or misconduct of said CONTRACTOR; or because of any claims or amounts recovered from any infringements or patent trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act" or of any other law, ordinance, order or decree; and so much of the money due to the said CONTRACTOR under and by virtue of his/her contract as shall be considered necessary by the CITY for such purpose, may be retained; or in case no money is due, his surety may be held until such suit or suits, action or actions, claim or claims, for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the CITY.

Waiver of Subrogation

Payment of any claim or suit including any expenses incurred in connection therewith by the CITY, or any insurance company on behalf of the CITY shall not constitute a waiver of subrogation against the CONTRACTOR, sub-contractors or any lower tier contractor in the event that such claim or suit was caused by or contributed to as a result of the negligent acts of the CONTRACTOR, any sub-contractors or lower tier contractors.

Construction Agreement

The CONTRACTOR shall and does hereby agree to indemnify, save harmless and defend the CITY from the payment of any sum or sums of money to any person whomsoever on account of claims or suits growing out of injuries to persons, including death, or damages to property, caused by the CONTRACTOR, his employees, agents or sub-contractors or in any way attributable to the performance and execution of the work herein contracted for, including (but without limiting the generality of the foregoing), all claims for service, labor performed, materials furnished, provisions and suppliers, injuries to persons or damage to property, liens, garnishments, attachments, claims, suits, costs, attorney's fees, costs of investigation and defense. It is the intention of this paragraph to hold the CONTRACTOR responsible for the payment of any and all claims, suits, or liens, of any nature character in any way attributable to or asserted against the CITY, or the CITY and the CONTRACTOR, which the City may be required to pay. In the event the liability of the CONTRACTOR shall arise by reason of the sole negligence of the CITY and/or the sole negligence of the CITY's agents, servants or employees, then and only then, the CONTRACTOR shall not be liable under the provisions of this paragraph.

DAMAGES:

9.The CONTRACTOR shall defend, indemnify and save harmless the CITY and all persons acting for or in behalf of it against all claims for injuries (including death), loss or damage, arising out of the performance out this contract.

LIENS:

10.Neither the final payment nor any part of the retained percentage shall become due until the CONTRACTOR, if required, shall deliver to the CITY a complete release of all liens arising out of the Agreement, or receipts in full in lieu thereof and, if required in either case, an affidavit that so far as it has knowledge or information the releases and receipts include all the labor and material for which a lien could be filed; but the CONTRACTOR may, if any SUB-CONTRACTOR refuses to furnish a release or receipt in full, furnish a bond satisfactory to the CITY to indemnify it against any lien. If any lien remains unsatisfied after all payment are made, the CONTRACTOR shall refund to the CITY all moneys that the latter may be compelled to pay in discharging such a lien, including all costs and a reasonable attorney's fee.

ASSIGNMENT:

11. Neither party to the Agreement shall assign the Agreement or sublet it as a whole without the written consent of the other, nor shall the CONTRACTOR assign any moneys due or to become due to it hereunder, without the previous written consent of the CITY.

SUBCONTRACTS:

12. The CONTRACTOR shall not sublet any part of this Agreement without the written permission of the CITY. The CONTRACTOR agrees that it is as fully responsible to the CITY for the acts and omissions of its SUB-CONTRACTORS and of persons either directly or indirectly employed by them, as it is for the acts and omissions of persons directly employed by it.

USE OF PREMISES:

13. The CONTRACTOR shall confine its apparatus, the storage of materials and operations of its workers to limits indicated by law, ordinance and permits and shall not otherwise unreasonably encumber the premises with its materials. If any part of the project is completed and ready for use, the CITY may, by written and mutual consent, without prejudice to any of its rights or the rights of the CONTRACTOR, enter in and make use of such completed parts of the project. Such use or occupancy shall in no case be construed as an acceptance of any work or materials.

CLEANING UP:

14. The CONTRACTOR shall at all times keep the premises free from accumulation of waste materials or rubbish caused by its employees or work, and at the completion of the work it shall remove all its rubbish from and about the project, and all its tools, scaffolding and surplus materials and shall leave its work "broom-clean" or its equivalent, unless more exactly specified. In case of dispute, the CITY may remove the rubbish and charge the cost to the CONTRACTOR.

PAYMENTS:

15. Unless otherwise agreed to, the CITY shall make payments on account of the Agreement as follows:

Within 30 days, as invoices are submitted for work completed to the satisfaction of the CITY.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day and year first above written.

BY:_____ BY:_____
Witness Finance Director

BY:_____ BY:_____
Witness

SCOPE OF WORK

The following scope of work is being proposed for the Sopers Mill Crossing Project for the City of Auburn. The scope of work is a brief overview of the expected extent of work included in this contract.

Base Bid

- Conduct pre-construction condition survey with Engineer;
- Provide flow control and by-pass pumping, as required;
- Provide demolition debris collection, containment and disposal;
- Perform lead paint sampling and testing on existing I-beams;
- Repair concrete spalls on wing and abutment walls;
- Repair deteriorated footings and wall cap;
- Paint existing I-beams;
- Provide cure and seal water repellent compound on all existing and repaired concrete surface exposed to view; and
- Restore all area disturbed by contractor operations.

Bid Alternate (if lead paint is detected in existing I-beams)

- Abate lead-containing paint in strict accordance with all applicable local, state and federal regulation.

SPECIAL PROVISIONS

The following Supplemental Specifications and Special Provisions shall amend the “Maine, Department of Transportation Standard Specifications, **November 2014 Edition**" including any and all applicable revisions and special provisions. In case of conflicts, these Supplemental Specifications (1) and Special Provisions (2) shall take precedence and shall govern.

(1) Supplemental Specifications - modifications, additions and deletions to the existing Standard Specifications.

(2) Special Provisions - specifications in the contract which are for additional items not covered in the Standard Specifications

F-1 Work Hours

No work shall proceed on this project prior to the hour of 7:00 AM or after 6:00 PM (prevailing time) on any working day unless the City has granted prior approval. The definition of work for this specification shall include starting or moving of equipment, machinery, or materials. Any day worked for four hours or more will be considered a full working day.

F-2 Notification of Residents

Residents shall be notified sufficiently in advance of any construction affecting the driveway and sidewalk to allow adequate time for their removal of personal vehicles. Locations of cuts for drive access affecting individual residents shall be brought to their attention.

F-3 Traffic Signs

All existing traffic signs, which are to be removed during construction, shall be dismounted and the posts removed and shall be stacked in an area approved by the Engineer. Contractor shall protect the signs from damage while in his possession and shall repair, at no additional cost to the City, any damages cause by his operations.

Stop signs are to be maintained at their original locations at all times during the progress work.

Prior to the start of any construction work, the Contractor shall prepare an acceptable inventory of all signs within the project limits which shall be used as a guide for replacement should signs be removed for construction purposes.

This work shall be considered as subsidiary obligation of the contract for which no special payment will be made.

F-4 Protection of Trees

The Contractor shall be responsible for the preservation of all trees on the project, which are not to be removed. Any trees damaged by the Contractor's operations shall be repaired as approved by tree dressing or paint in accordance with the appropriate provisions of Section 201 of Standard Specifications.

F-5 Maintenance and Protection of Traffic

The Contractor shall be responsible for the maintenance and protection of all vehicular and pedestrian traffic at all times during construction and shall erect suitable warning signs, flashing barriers or temporary lighting devices of sufficient size and number to afford protection to the traveling public in accordance with the most recent edition of "Manual on Uniform Traffic Control Devices for Streets Highways" published by the Department of Transportation of the Federal Highway Administration.

The Contractor shall be held responsible for all damage to the work due to any failure of the warning devices to properly protect the work from the traffic, pedestrians or other causes. Traffic control shall be in accordance with the City of Auburn’s Traffic Detail Policy effective April 1, 2006.

F-5A Materials

Materials shall meet the requirements specified for the various subsections of the Specifications. Equals shall be approved only prior to the bid opening.

F-6 Survey

The City of Auburn, Department of Public Services will establish, at their discretion, a benchmark location and one construction baseline. The Contractor shall be responsible for maintaining these controls during construction and providing all additional survey required, which shall be done by a competent Engineer or Surveyor.

F-7 Waste Areas

The disposal of stumps shall follow Section 201.07.

F-8 Occupational Safety and Health

The Contractor is hereby advised that all work to be furnished to the City shall be performed with equipment, methods, and use of personnel in conformance with the pertinent Occupational Safety and Health Act requirements of the State of Maine and with the regulations for construction as specified by the Department of Labor and Occupational Safety and Health Administration (OSHA) as currently amended.

F-9 Pre-Construction Conference

A conference will be held at 60 Court Street, Auburn, Maine within ten (10) days after the awarding of the contract. At this time, the contractor will be required to submit a graphically illustrated schedule and a plan showing project activities. City officials and representatives of the various utility companies involved in the project will be present at this meeting.

It is the purpose of this meeting to inform the various agencies of the proposed work schedule, and to give them the opportunity of discussing any difficulties and of offering suggestions to the Contractor concerning his proposed schedule in order that full cooperation may be reached.

F-10 Schedule of Operations

The above-mentioned schedule of operations in Section F-9 shall consist of a bar chart detailing the activities included in the contract. Although a bar chart is acceptable as a minimum, more complex and detailed schedules (i.e., flow charts, critical paths, etc.) are encouraged and will be accepted by the City. Updates will be required.

F-11 Traffic Officers

Traffic control shall be the responsibility of the Contractor and as directed. Traffic control officers will be employed by the contractor. City of Auburn police officers may be required in certain traffic situations and will be paid for by the City of Auburn.

F-12 Limitation of Operations

The Contractor shall conduct the work at all times in such a manner and in such sequence as will assure the least interference with traffic. The Contractor shall not open up work to the prejudice or detriment of work already started. The Engineer may require the Contractor to finish a section on which work is in progress before work is started on any additional sections, if finishing such section is essential to public convenience.

F-13 Questions Regarding Plans and Documents

Questions from prospective bidders relative to this Contract shall be submitted no later than five days before bid opening and directed to:

Tony Beaulieu P.E.
City Engineer
Engineering Division
Tel. 333-6601 ext. 1140

F-14 Record Drawings

The Contractor shall keep daily records of all changes in the work and records of underground infrastructure. Upon completion of the project, the Contractor shall deliver to the Engineer copies of daily records. Final payment will not be made until Engineer receives copies of daily records.

F-15 Waste Material

All waste material shall be removed from the site and the area left clean upon completion of work. Any equipment or structures damaged by the Contractor shall be repaired or replaced at no additional cost to the City.

F-16 Quality Assurance

The Contractor shall be responsible at all times for maintaining top quality assurance during performance of his work.

F-17 Bids

No bids shall be withdrawn within a period of sixty -(60)- days after the opening of the bids.

SUPPLEMENTAL SPECIFICATIONS
SECTION 100 - GENERAL PROVISIONS

1. SCOPE

The work covered by this section includes furnishing all labor, equipment, materials, incidentals, and the performing of all operations in connection with the work encompassed by these contract documents. All work shall be subject to the terms and conditions of the contract documents.

2. STANDARD SPECIFICATIONS

The City of Auburn, Maine has adopted for this project, the "State of Maine, Department of Transportation, Standard Specifications, **November 2014 Edition**", and the Standard Details (**November 2014 Edition**) and the following Supplemental Specifications including all current additions or modifications thereof. In the case of conflict with the following Supplemental Specifications, addenda shall take precedence and shall govern.

Wherever in the Specifications and in this Contract the term "Department", "the Department of Transportation", "MDOT", or any reference to the "State of Maine, Department of Transportation" or its "Engineers" is mentioned, the intent and meaning shall be interpreted to refer to the CITY OF AUBURN, MAINE, or their authorized representative.

SUPPLEMENTAL SPECIFICATIONS
SECTION 102 - BIDDING

1.01 DESCRIPTION:

A. Work under this Contract will be paid for as defined within this section and in accordance with the Payment Terms outlined in the Agreement. References in Division 100 through Division 700 of the State of Maine Department of Transportation Standard Specifications to "method of measurement" and "basis of payment" should be disregarded, unless noted otherwise.

B. Scope: This section describes the measurement and payment for the Work to be completed under each item in the Bid. Work as defined in the State of Maine Department of Transportation Standard Specifications, is all labor, services, personnel, materials, equipment, tools, supplies, and incidentals required or indicated by the Contract in Conformity with the same. All Work not specifically identified in the description of bid items shall be considered a subsidiary obligation of Contractor and all costs in connection therewith shall be included in the prices bid.

C. Payment Procedures are described in Article 5 of the Agreement.

1.02 SUBMITTALS:

A. Detailed Cost Breakdown: Within five (5) working days of the date of the Contract Award, submit a detailed cost breakdown for all items listed within the Bid Form. The detail shall be sufficient for Woodard & Curran to estimate the amount of work performed to make Progress Payment, consistent with Section 108 of the Maine Department of Transportation Standard Specifications.

1.03 DESCRIPTION OF BASE BID ITEMS:

Bid Item 1 – Rehabilitation of Sopers Mill Road Crossing

1. Payment: Lump sum price as stated in the bid form.

2. Measurement: Determine percentage of work completed to date relative to total work as shown on Contract Plans.

3. Includes all costs, materials, and labor associated with the rehabilitation of the existing crossing structure over Soper Mill Brook, including but not limited to site preparation, erosion and sedimentation control measures, brook flow control and by-pass pumping; lead paint sampling and testing of existing I-beams; surface cleaning; installation of water repellent compound; dust control; demolition debris collection, containment and clean-up; and installation of loam and seed as required to restore disturbed areas as shown and described within the Contract Documents. Price shall

include all costs associated with mobilization, site security, pre-construction condition survey and administration for the project work.

Bid Item 2 – Repair Type ‘A’ Minor Concrete Spall Repair

1. Payment: Unit Price per square foot as stated in the bid form.
2. Measurement: As measured by Engineer following the perimeter of each repair area.
3. Includes all costs, materials, and labor associated with Repair Type ‘A’ as specified and where indicated on Drawings S-101 and S-102.

Bid Item 3 – Repair Type ‘B’ Moderate Concrete Spall Repair

1. Payment: Unit Price per square foot as stated in the bid form.
2. Measurement: As measured by Engineer following the perimeter of each repair area.
3. Includes all costs, materials, and labor associated with Repair Type ‘B’ as specified and where indicated on Drawings S-101 and S-102.

Bid Item 4 – Type ‘C’ Major Concrete Spall Repair

1. Payment: Unit Price per square foot as stated in the bid form.
2. Measurement: As measured by Engineer following the perimeter of each repair area.
3. Includes all costs, materials, and labor associated with Repair Type ‘C’ as specified and where indicated on Drawings S-101 and S-102.

Bid Item 5 – Type ‘D’ Wall Cap Repair

1. Payment: Unit Price per square foot as stated in the bid form.
2. Measurement: As measured by Engineer following the perimeter of each repair area.
3. Includes all costs, materials, and labor associated with Repair Type ‘D’ as specified and where indicated on Drawings S-101 and S-102.

Bid Item 6 – Type ‘E’ Minor Footing Repair

1. Payment: Unit Price per linear foot as stated in the bid form.
2. Measurement: As measured by Engineer following the centerline of footing.

3. Includes all costs, materials, and labor associated with Repair Type ‘E’ as specified and where indicated on Drawings S-101 and S-102.

Bid Item 7 – Type ‘F’ Major Footing Repair

1. Payment: Unit Price per linear foot as stated in the bid form.

2. Measurement: As measured by Engineer following the centerline of footing.

3. Includes all costs, materials, and labor associated with Repair Type ‘F’ as specified and where indicated on Drawings S-101 and S-102.

Bid Item 8 – Type ‘G’ 12” I-Beam Painting Repair

1. Payment: Lump sum price as stated in the bid form.

2. Measurement: Determine percentage of work completed to date relative to total work as shown on Contract Plans.

3. Includes all costs, materials, and labor associated with Repair Type ‘G’ as specified and where indicated on Drawings S-101 and S-102.

1.04 DESCRIPTION OF BID ALTERNATE ITEMS:

Bid Item A – Lead Paint Abatement

1. Payment: Lump sum price as stated in the bid form.

2. Measurement: Determine percentage of work completed to date relative to total work as shown on Contract Plans.

3. Includes all costs, materials, and labor associated with the abatement of lead-containing paint as shown and described within the Contract Documents.

SUPPLEMENTAL SPECIFICATIONS
SECTION 615 – LOAM, SEED & MULCH

The provisions of Section 615 of the Standard Specifications shall apply with the following additions and modifications

615.01 Description

This work shall consist of loaming and seeding all vegetated areas disturbed by contractor operations. Loam and its applications shall conform to the requirements of Section 615 of the Standard Specifications. Loam shall have a finished depth of four (4") inches and shall be screened through a one (1") inch square mesh screen**. Loam areas shall be rolled (compacted) prior to placement of seed and mulch.**

Seeding shall be Method Number 1 and shall conform to the requirements of Section 618 of the Standard Specifications. The Contractor shall be required to continually seed area of loam and seed until a satisfactory growth of grass is established. If so required, all areas to be loamed and seeded shall be mulched with an approved wood cellulose fiber compatible with recommended hydro-seeding practices. This mulch shall be applied simultaneously with the seed and shall be of sufficient quantity to protect the seed and hold moisture in to insure a satisfactory growth of grass.

The specifications for the wood cellulose fiber proposed to be used shall be presented to the Engineer for acceptance at least ten (10) days (working days) prior to the application thereof.

615.02 Materials

After a sample of loam has been submitted to the Engineer, he may require that a sample be submitted to a testing agency to determine its organic content, characteristics, and potential use as loam suited to the site.

SUPPLEMENTAL SPECIFICATIONS
SECTION 652 – MAINTENANCE OF TRAFFIC

The provisions of Section 652 of the Standard Specifications shall apply with the following additions and modifications.

652.3.6 Traffic Control

The Contractor shall maintain access to all drives on Sopers Mill Road during construction. Two-way traffic flow shall be required on all streets during non-working hours.

The Contractor must submit a written Traffic Control Plan before the Preconstruction Meeting to the City Engineer for approval.

TECHNICAL SPECIFICATIONS
SECTION 02 26 00
HAZARDOUS MATERIAL ABATEMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Conduct a hazardous material assessment of existing bridge I-beams in accordance with this Section.

2. Related Requirements

a. 02 80 05 Hazardous Material Abatement

1.02 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

A. Review existing building Specifications and Plans and related information. Coordinate with the Engineer to obtain available documents.

B. Inspect existing bridge I-beams to locate, quantify, assess, and sample suspect material.

C. Repair damage and patch holes made during sampling.

3.02 LEAD PAINT

A. Lead paint survey: conducted by lead inspector licensed in the state of the Project location.

B. Test materials for the presence of lead based paint, using a state of the art NITON X-ray fluorescence analyzer (XRF).

3.03 MINIMUM REPORT CONTENTS

A. Provide written results of findings of lead paint survey on state-approved lead paint inspection forms.

B. Provide recommended abatement measures for identified hazardous materials including requirements included in Section 02 80 05.

C. Perform abatement only after approval by City

END OF SECTION

TECHNICAL SPECIFICATIONS
SECTION 02 80 05
HAZARDOUS MATERIAL ABATEMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Minimum requirements for removal, containment, and legal disposal or recycling of hazardous and regulated materials including lead containing paint generated as a result of the Work, in accordance with this Section and Laws and Regulations

1.02 REFERENCES

A. Reference Standards

1. Department of Environmental Protection (DEP) for state where Project is located

2. Department of Health or similar agency in State where Project is located

3. Environmental Protection Agency (EPA)

   a. 40 CFR Subchapter I – Solid Wastes

   b. 40 CFR Subchapter R – Toxic Substances Control Act (TSCA) (also 15 USC § 2601 et seq.)

4. Occupational Safety and Health Administration (OSHA)

   a. OSHA 29 CFR 1926, Safety and Health Regulations for Construction

5. Resource Conservation and Recovery Act (RCRA)

6. U.S. Department of Transportation (U.S. DOT)

   a. 49 CFR Subtitle B, Chapter I, Subchapter A, Hazardous Materials and Oil Transportation

B. Local and county Board of Health and Fire Department rules, regulations, notifications and permits

1.03 SUBMITTALS

A. Lead Paint Abatement

1. Lead Paint Work Plan and Lead Compliance Program per 29 CFR 1926.62, including proposed worker training, respiratory protection program and medical monitoring for employees throughout all phases of the Work, including make, model and NIOSH approval numbers of respirators to be used; worker orientation plan; written description of proposed procedures, methods, or equipment to be utilized.

    a. Protocol for testing paint to determine the presence of lead

    b. Results of lead testing

    c. Name and address of the testing laboratory, certification(s) of AIHA accreditation for metal analysis, listing of relevant experience in air and bulk lead analysis, and presentation of a documented quality assurance and quality control program

    d. Air sampling results

    e. Personnel monitoring results

    f. Copies of written medical opinions for each employee who may be occupationally exposed to lead, as required by 29 CFR 1926.62 (j) (3) (v).

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Minimum personnel training and certification per EPA, RCRA, OSHA and state DEP/DOH requirements.

2. Lead testing lab: AIHA accredited for analysis of metals.

1.05 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1. Refer to Hazardous Material Assessment.

2. Common materials that may contain h regulated materials include lead paint.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

A. Protect personnel and the environment against exposure to hazardous and regulated materials removed.

B. Engineer may stop hazardous and regulated material removal and abatement Work and for noncompliance with the Specification and violation of applicable Laws and Regulations are identified especially if there is potential impact to human health, the environment, and proper completion of the Project.

C. Prior to assignment to any abatement Work, provide each employee with information regarding the potential hazards of lead paint, and safety and health precautions.

D. Implement a Spill Prevention Control and Countermeasure Plan pursuant to 40 CFR 761.

E. Remove potentially hazardous and regulated materials or stored items prior to renovation activities and either recycle or legally dispose of in accordance with RCRA, DEP Hazardous Waste Regulations, and other applicable Laws and Regulations.

F. Maintain required acknowledgements, certifications, logs, and documentation for the following on Site during demolition, removal and abatement activities at a location approved by the Engineer.

- Certifications of required worker training
- Medical examinations required by OSHA 29 CFR 1926
- Documentation of fit-testing specifically for respirators used on the Project
- Material Safety Data Sheets of supplies/chemicals
- Approved abatement work plans and programs
- List of emergency telephone numbers
- Waste Disposal Log

G. Personal Protective Equipment (PPE)

1. Provide each employee performing abatement Work information on the use and requirements of PPE. Proper PPE may vary depending on the activity, but may include disposable gloves, disposable rubber boots, steel-toe boots, Tyvek suits, respirators, hard hats, hearing protection, and/or eye protection.

3.02 LEAD CONTAINING PAINT REMOVAL/ABATEMENT

A. Preparation

1. Test representative bridge components prior to proposed rehabilitation work.

2. Assume that any painted surface not tested contains lead paint.

3. Designate the areas for lead paint abatement as “Lead Paint Work Area”.

4. Use physical barriers where necessary, to limit access to the Work area for the duration of the demolition/lead paint abatement Work.

5. Post lead paint caution signs, warning signs and barrier tapes at all approaches to the Lead Paint Work Area. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the Lead Paint Work Area. Post emergency exits only on the Lead Paint Work Area side, post with lead paint caution signs on the non-Lead Paint Work Area side.

6. Erect isolation barriers as necessary to control exposure to lead-containing dust.

7. Provide authorized workers with suitable PPE whenever they enter the Lead Paint Work Area.

B. Minimum Requirements for Demolition Performed on Painted Components

1. Implement feasible engineering controls as described in the Lead Paint Work Plan and Lead Compliance Program to minimize the possibility of contamination of areas adjacent to the Lead Paint Work Area.

2. Inform workers of the components to be impacted during demolition that are identified as containing lead.

3. Clean up and properly containerize loose and flaking paint present on both interior and exterior surfaces.

4. Use demolition methods to eliminate dispersion of lead paint chips and debris to immediate area surrounding the Lead Paint Work Area. Clean up any lead paint chips and debris that should migrate to the surrounding area/ground during demolition.

5. Perform lead paint abatement if demolition activities (i.e. mechanical sanding or stripping or abrasive methods of paint removal) will directly impact any surface on which lead based paint is present.

6. Do not perform demolition activities that increase the workers’ exposure above the Action Level of 30 µg/m3. Comply with the OSHA lead standard 29 CFR 1926.62. See Air Sampling and Personnel Monitoring.

7. Characterize debris containing lead generated from demolition activities to determine disposal requirements (construction debris or Hazardous Waste) by performing the toxicity characteristic leachate procedure (TCLP) or

using other methods consistent with Laws and Regulations which accurately characterize the waste.

C. Lead Paint Abatement

1. Comply with the OSHA lead standard at 29 CFR 1926.62.

2. Prevent demolition or renovation activities that increase the workers' exposure above the Action Level of 30 µg/m^3

3. Inform workers of the components to be impacted during renovation or demolition that have been identified as containing lead.

4. Worker protection shall comply with the OSHA Lead Standard 29 CPR 1926.62 at a minimum.

5. Prevent unprotected, untrained workers or trades from performing any related Work within the same vicinity as Work involving components identified with lead until clean-up procedures are completed.

6. Provide hand washing facilities and assure that all workers thoroughly wash their hands and face upon exiting Lead Paint Work Areas.

7. Initiate and continue sufficient engineering and Work practice controls, as described in the Lead Paint Work Plan and Lead Compliance Program, to reduce and maintain worker exposures to lead at or below the Action Level.

8. Maintain Lead Paint Work Area free of accumulated debris and paint chips of demolition involving lead.

9. Ensure workers pay careful attention to cleanse the hands and face when decontaminating (provide hygiene facilities, including shower, as required based on initial assessment and continued monitoring);

10. Thoroughly wet the areas to be demolished and mist the air to reduce the potential for creating airborne lead and dust;

11. Ensure that equipment used by the Workers is either left inside the Lead Paint Work Area or thoroughly decontaminated before being removed from the Lead Paint Work Area. Ensure extra Work clothing (in addition to the disposable suits supplied by the Contractor) are left in the clean area until the completion of Work in the Lead Paint Work Area.

12. Clean the clean area of visible debris and disposable materials daily.

13. Do not permit workers or supervisory personnel to eat, drink, smoke, chew gum, or chew tobacco in the Lead Paint Work Area under any

circumstance, otherwise demolition operations shall be stopped by Engineer.

14. Only allow workers or supervisory personnel to remove their protective respirators, if applicable, while in the Lead Paint Work Area in the case of life threatening emergency. In this situation, respirators are to be removed for as short a duration as possible.

D. Air Sampling and Personnel Monitoring

1. Perform personnel air sampling during demolition/lead paint abatement work to determine worker exposure limits. Post results of such sampling, provide to individual workers and submit to Engineer.

2. Provide sampling to check personnel exposure levels. Take representative sampling for the duration of the Work shift or for 8 hours, whichever is less. Personnel samples need not be taken for repeated working conditions if working conditions remain unchanged, but must be taken every time there is a change in the abatement/removal operation, either in terms of the location or the type of Work.

3. Use sampling to determine 8-hour Time-Weighted-Averages (TWA).

4. Conduct personnel sampling as outlined in OSHA Standard 29 CFR 1926.62.

5. Transmit air sampling results to the Engineer and individual workers available at the Site in written form no more than 48 hours after the completion of a sampling cycle. List each sample's result, sampling time and date, personnel monitored, task performed while monitored, flow rate, sample duration, sample yield, cassette size, and analyst's name and company, and include an interpretation of the results. Report air sample analysis results in micrograms/cubic meter (µg/m3).

6. Establish air monitoring frequency in accordance with the requirements set forth in 29 CFR 1926.62.

E. Comply with Laws and Regulations applicable to lead waste and recyclable storage.

1. Location of Hazardous Waste and recycling containers on Site: subject to Owner and Engineer's approval.

2. Manage waste from demolition and lead paint abatement that is regulated under the TSCA and classified as a Hazardous Waste subject to transportation under a Uniform Hazardous Waste Manifest.

F. Legally dispose of Hazardous Waste determined to be coated with lead-based paint, performing testing and other requirements imposed by the disposal facility. Comply with the requirements of RCRA and applicable Laws and Regulations.

3.03 CLEAN UP

A. Maintain the various Hazardous Waste Work Sites in a neat and orderly manner at all times, so as not to interrupt or infringe upon the Work of other trades.

B. Comply with all requirements for release of various Hazardous Waste Work Sites.

END OF SECTION

TECHNICAL SPECIFICATIONS
SECTION 03 01 05
CONCRETE REPAIR

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Repair new concrete when permitted by the Engineer and fill form tie holes, both as per Section 03 30 20, and repair deteriorated concrete areas as defined on the Drawings, and in accordance with this Section.

B. Related Requirements

1. Section 03 30 20 Concrete Placing, Curing and Finishing

1.02 REFERENCES

A. Reference Standards

1. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

a. AASHTO T 277 Standard Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration

2. ASTM INTERNATIONAL (ASTM)

a. ASTM C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens)

b. ASTM C1202 Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration

c. ASTM C78 Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

d. ASTM C496 Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens

e. ASTM C882 Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear

f. ASTM C884 Thermal Compatibility between Concrete and Epoxy-Resin Overlay

g. ASTM G109 Determining the Effects of Chemical Admixtures on the Corrosion of Embedded Steel Reinforcement in Concrete Exposed to Chloride Environments

1.03 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Trowel-grade polymer modified portland cement repair mortar

2. Non-sag polymer modified portland cement repair mortar

3. Reinforcing steel primer

C. Notarized certificate stating that repair material meets the specified requirements and the manufacturer's current printed product literature.

D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers.

B. Store in accordance with manufacturer recommendations.

1.05 SITE CONDITIONS

A. Existing Conditions:

1. Take precautions to avoid damage to surface due to mixing and handling of the specified repair material near the area of Work.

PART 2 – PRODUCTS

2.01 MORTAR

A. Performance/Design Criteria

1. Mixed Properties

a. Application time: approximately 15 minutes.

b. Finishing time: 20-60 minutes.

c. Color: concrete gray.

2. Cured Properties

a. Compressive strength (ASTM C109)

1) 1 day: 3,000 psi minimum.

2) 28 day: 7,000 psi minimum.

b. Splitting Tensile Strength (ASTM C496)

1) 28 day: 750 psi minimum

c. Flexural Strength (Modulus of Rupture, ASTM C78)

1) 28 day: 2,000 psi minimum.

d. Bond Strength (ASTM C882, modified)

1) 28 day: 2,200 psi minimum.

e. Thermal Compatibility (ASTM C884, modified)

1) Passes test

f. Permeability (ASTM C1202, AASHTO T 277)

1) 28 day: approximately 500 coulombs.

g. Cracked Beam Corrosion Tests (ASTM G 109, modified)

1) Reduced corrosion rates: 63 percent versus control specimens.

B. Acceptable level of quality: equivalent to products manufactured by Sika Corporation meeting the specified performance requirements.

1. Trowel grade mortar: SikaTop 122 Plus

1. Non-sag mortar: SikaTop 123 Plus

2. Steel reinforcement primer: Sika Armatec 110 EpoCem

PART 3 – EXECUTION

3.01 GENERAL

A. Do not apply material in inclement weather or if inclement weather is imminent.

B. Condition product as recommended by the manufacturer.

3.02 SURFACE PREPARATION

A. Mechanically prepare areas to be repaired so they are clean, sound and free of contaminants. Remove loose and deteriorated concrete by mechanical means. Remove dirt, oil, grease, and bond-inhibiting materials from the surface.

B. Except where tie holes are filled, saw cut perimeter 1/8 inch minimum when a neat mortar is to be applied, and 1-inch minimum when an extended mortar is to be applied.

C. Prepare concrete substrate to obtain a minimum surface profile of 1/16 inch in depth with a new aggregate fractured surface using steel shot blasting, abrasive blasting, or water jetting (hydrodemolition). Do not use scabblers, bush hammers, or pneumatic hammers. Provide that the area to be repaired is not less than 1/8 inch in depth.

D. Prepare substrate to saturated surface dry condition with no standing water.

E. Steel Reinforcement Primer

1. Where reinforcement with active corrosion is encountered, sandblast to remove contaminants and rust, pressure wash, and apply primer.

2. Determine section loss and splice new reinforcement where there is more than 15 percent to 25 percent loss, as directed by the Engineer. If half or more of the diameter of the bar is exposed, chip out 1/2 inch minimum behind the bar.

F. Treat cracks in the substrate in the area of repair as directed by the Engineer.

3.03 MIXING AND APPLICATION

A. The following describes the specific procedures applicable for the Sika products specified in Part 2. Mix and apply in strict accordance with, and adhere to limitations and cautions of manufacturer's instructions.

1. Horizontal surfaces: SikaTop 122 Plus (trowel-grade) or equal.

2. Vertical and overhead surfaces: SikaTop 123 Plus (non-sag) or equal.

B. Trowel-Grade Polymer Mortar

1. Pour entire Component A into mixing container. Add entire Component B while mixing. For extended mix, introduce 3/8 inch coarse aggregate at desired quantity. Mix to uniform consistency, maximum 3 minutes.

a. Addition rate not to exceed 42 pounds per bag.

b. Aggregate: non-reactive, clean, well-graded, saturated surface dry, with low absorption/high density.

2. Scrub mortar into substrate, filling pores and voids. Force material against edge of repair, working toward center. After filling repair, consolidate, then screed. Allow mortar or concrete to set to desired stiffness and finish with wood or sponge float for a smooth surface.

a. Minimum application thickness: 1/8 inch for a neat mortar; 1 inch if extended.

b. Maximum application thickness in a single lift: 1 inch for a neat mortar; 3 inches if extended.

c. Where multiple lifts are required, score top surface of the preceding lift to produce a roughened surface. Allow preceding lift to reach final set prior to applying the next lift.

C. Non-Sag Polymer Mortar

1. Pour entire Component A into mixing container. Add entire Component B while mixing. Mix maximum 3 minutes to uniform consistency.

2. Scrub mortar into substrate, filling pores and voids. Force material against edge of repair, working toward center. After filling repair, consolidate, then screed. Allow mortar or concrete to set to desired stiffness and finish with wood or sponge float for a smooth surface.

a. Minimum application thickness: 1/8 inch.

b. Maximum application thickness in a single lift: 1-1/2 inches.

c. Where multiple lifts are required, score top surface of the preceding lift to produce a roughened surface. Allow preceding lift 30 minutes minimum to reach final set prior to applying the next lift.

D. Curing

1. Moist cure with wet burlap and polyethylene using a fine mist of water or water based compatible curing compound. Do not use curing compounds for curing between successive lifts. Do not use solvent-based curing compounds. Commence moist curing immediately after finishing. Protect newly applied material from direct sunlight, wind, rain, and frost.

3.04 FIELD QUALITY CONTROL

A. Final Inspection: All completed repairs shall be visually inspected and hammer-sounded by the Engineer. Any areas which are unsound or hollow when hammer-sounded, or show evidence of cracking, delamination, or other surface defects shall be removed and replaced, as approved by the Engineer.

B. Mortar Manufacturer Field Services: Furnish the services of a qualified manufacturer's field representative prior to commencement of application to provide instruction, demonstrate proper application and inspection procedures, and to inspect the finish of the prepared surfaces prior to application of mortar.

3.05 CLEANING

A. Leave finished Work and Work area in a neat, clean condition without evidence of spillovers on adjacent areas.

END OF SECTION

TECHNICAL SPECIFICATIONS
SECTION 03 11 00
CONCRETE FORMING

PART 1 – GENERAL

1.01 SUMMARY

A. The Work of this section comprises all materials, tools, equipment and labor required for the design, preparation and cleaning, construction, and removal of all concrete formwork, and the installation of all concrete embedments furnished under other sections, necessary for the proper completion of the Work in accordance with this Section.

B. Related Requirements

1. Section 03 30 20 Concrete Placing, Curing and Finishing

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Supplemental Specifications Section 102

1.03 REFERENCES

A. Reference Standards

1. AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary

b. ACI 301 Specifications for Structural Concrete

c. ACI 347 Guide to Formwork for Concrete

2. ASTM INTERNATIONAL (ASTM)

a. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field

b. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

3. U.S. ARMY CORPS OF ENGINEERS (USACE)

a. COE CRD-C 572 Corps of Engineers Specifications for Polyvinylchloride Waterstops

1.04 SUBMITTALS

A. Product Data

1. Form Panel Systems

2. Form Ties

3. Form Release Agent

B. Manufacturer's Instructions

1. Form Ties

2. Form Release Agent

PART 2 – PRODUCTS

2.01 MATERIALS

A. General

1. Formwork shall conform dimensionally to the concrete Work as shown on the Drawings. To minimize the number of panel joints, formwork panels shall be of the largest practicable sizes. Cylindrical walls shall be formed with circular formwork, not straight-segmented forms. Formwork shall be sufficiently tight to prevent leakage.

2. Undamaged smooth form facing materials such as plywood, hardboard, metal, and plastic, that will produce a smooth form finish, shall be used. Formwork shall not result in fins or offsets exceeding 1/8 inch. If used, aluminum forms with un-oxidized surfaces shall be pretreated with a paste made of calcium hydroxide and water, followed by water rinsing, repeated until hydrogen bubbles do not form.

B. Form Release Agent

1. Form release agent shall be non-grain raising, non-staining, and shall not leave a residue on the concrete nor adversely affect bonding of materials to be applied.

C. Form Ties

1. General Requirements

a. Form ties shall be adjustable length, sized to withstand construction loads, and upon removal shall prevent concrete spalling. Ties shall have break back indentation.

b. Plastic Cones: Form tie assembly with cone-shaped depressions at the concrete surfaces with break back ties. The protion of the tie remaining embedded in the concrete upon removal shall be equal to the depth of the cone specified.

c. Neoprene Washers: Flat washer sized to fit tightly on tie wire and positioned at the center of the tie wire.

d. Tie Systems that include plug style waterstops inserted into tie holes after removal of forms are not permitted.

2. Concrete tanks, Secondary Containment Structures, Basement Walls, and other walls adjacent to below-grade spaces:

a. Plastic Cones: 1” diameter x 1-1/2 inches deep (Special Order)

b. Neoprene Washers: Required on all form ties

3. All other work:

a. Plastic Cones: 1” diameter x 1” deep (Standard)

b. Neoprene Washers: Not required, unless noted otherwise on drawings.

PART 3 – EXECUTION

3.01 TECHNICAL REQUIREMENTS

A. The Contractor shall design, erect, shore, brace, and maintain formwork in accordance with ACI 301 to support all loads, including construction loads, until the concrete structure can support such loads.

3.02 CONSTRUCTION

A. Tolerances

1. Tolerances shall be in accordance with ACI 117.

B. Form Alignment

1. At locations where continuous surfaces are formed in successive units, forms shall be tightly fitted over the hardened concrete surface to obtain accurate surface alignment and to prevent leakage of mortar and the formation of fins, ridges, and other defects.

C. Chamfered Edges

1. All exposed concrete corners shall be formed with beveled strips to provide 3/4 inch chamfers, unless otherwise shown, specified, or directed by the Engineer.

2. Where concrete walls, columns, and beams abut masonry walls, the chamfer shall be omitted.

3. Where masonry walls are flush with the face of supporting concrete curbs, the chamfer shall be omitted.

4. Chamfering by grinding is prohibited.

D. Openings

1. Form openings in concrete where required for other Work. Upon failing to form such openings, provide them in a manner approved by the Engineer at no additional cost to the Owner.

2. Provide 6-inch PVC waterstop at the perimeter of such openings required to be watertight.

3. Except as otherwise specified, all such openings shall be filled with concrete after the Work to be installed therein is complete.

E. Cleanouts and Access Panels

1. Temporary openings shall be provided to facilitate cleaning and inspection prior to concrete placement, including at the bottom of wall forms. Cleanout openings are not permitted in exposed concrete, concrete exposed to view upon completion of the Work, whether or not it is painted, without the approval of the Engineer.

2. All refuse, sawdust, shavings, etc. shall be removed, and the forms broom cleaned before concrete placement.

F. Form Release Agent

1. Forms shall be coated with the approved form release agent before placement of reinforcing steel. Do not apply form release agent at locations of monolithic construction joints, which are construction joints with all the reinforcement continuous through the joint. Excess agent applied to the forms, and on the reinforcing steel and other surfaces requiring a concrete bond, shall be removed.

2. Forms for unexposed surfaces may be thoroughly wetted in lieu of the approved form release agent immediately before concrete is placed. However, form release agent shall be used in freezing weather.

3.03 REMOVAL

A. Form Removal

1. Form removal per ACI 347, as modified herein.

2. Forms shall be removed while ensuring the complete safety and serviceability of the structure. Forms or shoring for slabs, beams, and other suspended members shall not be removed until members are of sufficient strength to safely support their own weight and the weight thereon.

3. Newly unsupported portions of the structure shall not be subjected to heavy construction or material loading. Additional shores or re-shores shall be provided as required to adequately support the members during the construction period.

4. The Contractor shall be responsible for the proper removal of forms, shores, and bracing.

5. Spalling of concrete surfaces shall be prevented.

6. When forms are removed before the specified curing period (as specified in Section 03 30 20) is complete, measures shall be taken to continue curing and to continue providing thermal protection for the concrete.

7. Forms may be removed when the cumulative time during which the temperature of the air surrounding the concrete is above 50 degrees F are as follows

    a. Walls, columns, sides of beams and girders, and similar parts of the Work not supporting the weight of the concrete: 24 hours.

    b. When design superimposed load is less than the self-weight

        1) Beam and Girder Soffits

            a) Clear span less than 10 feet: 7 days

            b) Clear span 10 feet to 20 feet: 14 days

            c) Clear span more than 20 feet: 21 days

        2) Slabs

            a) Clear span less than 10 feet: 4 days

            b) Clear span 10 feet to 20 feet: 7 days

            c) Clear span more than 20 feet: 10 days

    c. When design superimposed load is more than the self-weight

        1) Beam and Girder Soffits

a) Clear span less than 10 feet: 4 days

b) Clear span 10 feet to 20 feet: 7 days

c) Clear span more than 20 feet: 14 days

2) Slabs

a) Clear span less than 10 feet: 3 days

b) Clear span 10 feet to 20 feet: 4 days

c) Clear span more than 20 feet: 7 days

d. Alternatively to the stripping times specified, additional concrete cylinders shall be made using representative concrete, witnessed and approved by the Engineer, and tested at no additional cost to the Owner. Such specimens shall be field cured in accordance with ASTM C31 under conditions that are not more favorable than the most unfavorable conditions for the portions of the concrete that the test specimens represent. The supporting forms and shores may be removed when the concrete strength as tested per ASTM C39 is a minimum of 70 percent of the specified design strength, as determined by the field-cured cylinders according to ACI 301.

B. Tie Holes

1. Filling of form tie holes and concrete finishing are specified in Section 03 30 20 CONCRETE PLACING, CURING AND FINISHING.

3.04 CLEANING AND REPAIR OF FORMS

A. Parts of forms reserved for reuse shall be inspected, cleaned, and repaired. Any parts dented, deformed, or otherwise rendered unfit for reuse shall be discarded.

END OF SECTION

TECHNICAL SPECIFICATIONS
SECTION 03 16 00
CONCRETE SPECIALTIES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all materials, tools, equipment, and labor necessary for the construction of concrete specialties as specified, as shown on the Drawings, and as necessary for the proper completion of the Work in accordance with this section.

2. Epoxy adhesive for installing drilled and epoxy rebar is specified herein.

B. Related Requirements

1. Section 03 30 00 Cast-In-Place Concrete

2. Section 03 30 20 Concrete Placing, Curing and Finishing

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Supplemental Specifications Section 102

1.03 REFERENCES

A. Reference Standards

1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

a. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

b. ASTM A1064 Standard Specification Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

c. ASTM C1107 Standard Specification for Packed Dry, Hydraulic-Cement Grout (Non-shrink)

d. ASTM D4832 Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders

2. ICC EVALUATION SERVICE (ICC-ES)

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

3. AMERICAN CONCRETE INSTITUTE (ACI)

a. ACI 355.2 Qualification of Post-Installed Mechanical Anchors in Concrete

b. ACI 355.4 Qualification of Post-Installed Adhesive Anchors in Concrete

1.04 SUBMITTALS

A. Product Data

1. Epoxy Adhesive (for drill and epoxy rebar)

a. ICC-ES report for manufacturer's specific product

b. Epoxy ultimate bond strength

c. Manufacture's chart for embedment to develop yield strength and tensile strength of ASTM A615, grade 60, rebar sizes #3 thru #11.

d. Storage requirements

e. Gel and cure times as a function of temperature

f. Installation temperature requirements for cartridges and base material

g. Drilling method (diamond drill bit shall be prohibited)

h. Drill bit diameter and depth of hole for rebar sizes

i. Hole cleaning procedure and required condition of hole

j. Requirements for discarding initial discharge to ensure proper mixing

k. Hole filling procedure

l. Time period when anchor cannot be contacted or otherwise disturbed

B. Shop Drawings

1. Reinforcement

PART 2 – PRODUCTS

2.01 CONCRETE FILLS

A. Concrete shall be as specified in Section 03 30 00, except it shall have a 28-day design compressive strength of 4,000 pounds per square inch, and a maximum water-to-cementitious ratio of 0.45.

B. Concrete fills of minimum thickness less than 2-1/4 inches, and those screeded into place by process equipment, shall have a 1/2-inch maximum size aggregate.

2.02 EPOXY ADHESIVE

A. Epoxy adhesive for installation of post-installed reinforcing bars denoted as “Drill and Epoxy”, “Drill & Epoxy”, or as otherwise called out on drawings.

B. Evaluation Requirements: ICC-ES evaluation report stating product is compliant with 2015 International Building Code and approved for use to resist static, wind and earthquake (Seismic Design Categories A through F) tension and shear loads in cracked and uncracked normal-weight concrete having a compressive strength of 2,500 psi to 8,500 psi. Evaluation reports with a listed renewal date month/year which is prior to the month/year the product is submitted for engineer’s review will be rejected.

C. Epoxy adhesive for anchoring reinforcement to concrete shall be a 2-component solid epoxy based system supplied in manufacturer's standard side-by-side cartridge and dispensed through manufacturer's standard static-mixing nozzle. Epoxy adhesive shall be:

1. Simpson Strong Tie: SET-XP or ET-HP
    a. SET-XP Compliance Report (ESR-2508)
    b. ET-HP Compliance Report (ESR-3372)
2. Hilti: HIT-RE 500-SD
    a. Compliance Report (ESR-2322)
3. Approved equal based
    a. Compliance Report to be submitted

D. Epoxy adhesive shall pass the creep test requirements of ICC-ES AC58.

E. The embedment depth shall be per the manufacturer's requirements and the ultimate strength exceeds the tensile strength of the bar, and the ultimate strength divided by a minimum factor of safety of 3.75 is at least 40 percent of the yield strength of the bar.

PART 3 – EXECUTION

3.01 EPOXY ADHESIVE

A. Installation: Per manufacturer’s installation instructions and as listed in the product ICC-ES Evaluation Report

B. Drilled and epoxied rebar shall be installed in concrete having a minimum age of 21 days at time of installation.

C. All cartridges shall have the expiration date clearly visible. Material past its expiration date shall not be used, and shall be immediately removed from the Site.

D. Diamond drill bits are not permitted. Hammer drills shall be used. Hole diameter size per manufacturer's installation instructions.

E. The initial material extruded from each cartridge shall be discarded in accordance with the manufacturer's instructions to ensure that all material is properly mixed.

F. Depth stop shall be used to ensure correct drilling depth. Drilled holes shall be blown out with air, thoroughly wire brushed with a repeated back and forth movement, blown out, thoroughly wire brushed, and blown out again. Adhesive shall be injected, starting from the bottom of the hole and slowly withdrawn as filling progresses to prevent air pockets.

G. Rebar shall remain completely undisturbed between the manufacturer's specified gel time and the full cure time. Zero load shall be applied during this time.

3.02 FIELD QUALITY CONTROL

A. Final Inspection of Concrete Fills and Equipment Pads: All completed concrete fill and equipment pads shall be visually inspected and hammer-sounded by the Engineer. Any areas which are unsound or hollow when hammer-sounded, or show evidence of cracking, delamination, or other surface defects shall be removed and replaced, as approved by the Engineer.

B. Manufacturer's Field Services

1. Epoxy Adhesive

a. Except where specified to be performed by personnel certified by an applicable program such as the ACI/CRSI Adhesive Anchor Installer Certification program or equivalent, as approved by the Engineer, the Contractor shall furnish the services of a competent manufacturer's field representative who shall be present at the Work Site prior to beginning installation in order to instruct the Contractor and the Engineer on proper installation and inspection procedures. Such instruction shall include a full and complete demonstration.

b. Installation of anchors horizontally or upwardly inclined to resist sustained tension loads shall be continuously inspected by the Engineer's special inspector approved for that purpose. The special inspector shall furnish a report to the Engineer that the Work covered by the report has been performed and that the materials and installation procedures conform to the Contract Documents and the Manufacturer's Printed Installation Instructions (MPII).

c. Proof loading: performed where required per ACI 355.4.

END OF SECTION

TECHNICAL SPECIFICATIONS
SECTION 03 20 00
CONCRETE REINFORCING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all materials, tools, equipment, and labor necessary for the fabrication and installation of all reinforcement as shown on the Drawings, as specified, and as necessary for the proper completion of the Work in accordance with this Section.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Supplemental Specifications Section 102

1.03 REFERENCES

A. Reference Standards

1. AMERICAN CONCRETE INSTITUTE (ACI)

   a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary

   b. ACI SP-66 ACI Detailing Manual

2. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

   a. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

   b. ASTM A767 Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

   c. ASTM A775 Standard Specification for Epoxy-Coated Steel Reinforcing Bars

   d. ASTM 1064 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

3. AMERICAN WELDING SOCIETY (AWS)

a. AWS D1.4 Structural Welding Code – Reinforcing Steel

4. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

a. CRSI 10MSP Manual of Standard Practice

1.04 SUBMITTALS

A. Product Data

1. Certified mill reports, including chemical and physical analyses

2. Dowel bar splicers and dowel inserts

B. Shop Drawings

1. Reinforcement Drawings: Comply with ACI SP-66, and include the following information

a. Sizes, dimensions, and locations for reinforcement and supports

b. Bending diagrams and schedules

c. Splices

d. Cover and clearances

e. Class designation and details of bar supports

f. Pertinent reinforced concrete details with dimensions and elevations

g. Items furnished by other trades or under other sections of the Specification that are to be cast in concrete where interference with reinforcement may occur

h. Reinforcement shall be shown on wall elevations with required sections, on beam elevations with required sections, on plan views of slabs with required sections. Provide plan details where walls intersect.

1.05 QUALITY ASSURANCE

A. Fabricate reinforcement in accordance with ACI 117.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver reinforcement in bundles with tags indicating size, length, and identification mark.

B. Store materials off the ground to prevent soiling and to facilitate subsequent inspection and handling.

PART 2 – PRODUCTS

2.01 STEEL REINFORCEMENT

A. General: Steel reinforcement shall include all bars, anchorages, stirrups, dowels, ties, tie-wire, chairs and other steel supports, and spacers as noted on the Drawings, specified, and as required for the proper completion of the Work.

B. Materials

1. Reinforcement bars shall be formed from new billet steel conforming to ASTM A615, Grade 60 except as otherwise specified.

2. Reinforcement bars shall be formed from new billet steel conforming to ASTM A615, Grade 60, galvanized per ASTM A767.

3. Plain wire fabric shall conform to ASTM 1064. Flat sheets shall be used, rolls are not permitted.

C. Tie Wire

1. 16-gauge minimum

2. FS QQ-W-461 annealed black, except for architectural concrete

3. ASTM A1064 galvanized steel, for architectural concrete

D. Bar Supports

1. Chairs, bolsters, spacers and other supports to properly position reinforcement shall conform to the bar support recommendations of CRSI 10MSP, and shall be of adequate strength and design to prevent displacement of reinforcement and discoloration of concrete.

2. Supports shall be Class 1 - plastic protected.

3. Supports for bottom reinforcement of slabs on soil shall be chairs with integral plates, or precast concrete blocks not less than 4-inches square with a compressive strength equal to that of the surrounding concrete. Precast blocks may only be used to support reinforcement not more than 3-inches from the bottom of the slab.

E. Fabrication

1. Steel reinforcement shall be fabricated to the sizes, shapes and dimensions shown on the Drawings, details and schedules. All bending shall be in accordance with CRSI 10MSP. All steel shall be bent cold and shall not be bent or straightened in a manner that will injure the metal. Bars with kinks or bends not so detailed shall not be used.

2. Bends for stirrups and ties shall be made around a pin having a diameter not less than 4 times the diameter of the bar. Bends for other bars shall be made around a pin having a diameter not less than 6 times the diameter of the bar, except for bars larger than 1-inch, the pin shall be not less than 8 times the diameter of the bar.

F. Dowel Bar Splicers and Dowel Inserts (DBS/DI)

1. Dowel bar splicers shall be a 2-component threaded rebar splice system. The internally threaded component shall be forged from Grade 60 deformed rebar material free of external machining or welding. It shall contain an integral flange with nailing holes and be threaded with Unified National Coarse (UNC) or UN (unified) threads to a depth equal to the nominal diameter of the threads plus 1/4 inch. The externally threaded splice component shall be fabricated from Grade 60 deformed rebar material and supplied with rolled threads corresponding with the internally threaded component. The root diameter of the threads shall provide a minimum cross sectional area equal to the cross sectional area of the nominal bar size. Manufacturer testing shall indicate ultimate tension failure occurring in the nominal bar diameter, not at the mechanical splice.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Reinforcement

1. Tolerances shall conform to ACI 117.

2. Placement

a. Reinforcement shall be accurately positioned both horizontally and vertically, and shall be properly secured and sufficiently rigid to prevent displacement during concrete placement.

b. Reinforcement shall be securely tied at intersections with tie wire or clips in a manner that will keep all metal away from exposed concrete surfaces.

3. Splices

a. Reinforcement splices shall be as shown on the Drawings. Where not shown, splices shall be located away from areas of maximum stress, and shall be approved by the Engineer.

b. Welding shall only be permitted by written approval of the Engineer, and shall be in accordance with AWS D1.4.

4. All reinforcement within an area of a continuous concrete placement shall be installed, supported, and secured before beginning the concrete placement.

5. Reinforcement Adjustment

   a. Adjust to within allowable tolerances to avoid interference with other reinforcement, conduits, or embedded items.

   b. Reinforcement shall not be moved beyond allowable tolerances without the Engineer's approval.

   c. Reinforcement shall not be heated, bent or cut without approval Engineer's approval.

B. Wire Fabric

   1. Wire fabric shall be installed in the longest practicable sheet.

   2. Adjoining sheets shall be lapped a minimum of 1-1/2 wire spacing’s and securely wired together.

   3. End laps in adjacent sheets shall be offset.

C. All reinforcement shall be entirely free from flaking rust, loose mill scale, grease, dirt, etc. that might reduce its bond with the concrete.

D. Concrete cover for reinforcement shall conform to the dimensions shown on the Drawings.

E. Notify the Engineer at least 24 hours before placing concrete. All reinforcement within the area of 1 day's concrete placement shall be tied in place and observed by the Engineer or Owner’s representative, prior to commencing concrete placement.

END OF SECTION

TECHNICAL SPECIFICATIONS
SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide cast-in-place concrete in accordance with this Section.

B. ACI 301 is hereby made a part of this Specification, except as otherwise modified by the Contract Documents.

C. Related Requirements

1. Section 03 16 00 Concrete Specialties

2. Section 03 30 20 Concrete Placing, Curing and Finishing

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Supplemental Specifications Section 102.

1.03 REFERENCES

A. Reference Standards

1. AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

   a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary

   b. ACI 301 Specifications for Structural Concrete

2. ASTM INTERNATIONAL (ASTM)

   a. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field

   b. ASTM C33 Standard Specification for Concrete Aggregates

   c. ASTM C40 Standard Test Method for Organic Impurities in Fine Aggregates for Concrete

   d. ASTM C88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

   e. ASTM C94 Standard Specification for Ready-Mixed Concrete

f. ASTM C131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

g. ASTM C143 Standard Test Method for Slump of Hydraulic-Cement Concrete

h. ASTM C150 Standard Specification for Portland Cement

i. ASTM C173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

j. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

k. ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete

l. ASTM C494 Standard Specification for Chemical Admixtures for Concrete

m. ASTM C535 Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

n. ASTM C595 Standard Specification for Blended Hydraulic Cements

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

p. ASTM C989 Standard Specification for Slag Cement for Use in Concrete and Mortars

q. ASTM C1116 Standard Specification for Fiber-Reinforced Concrete

r. ASTM C1157 Standard Specification for Hydraulic Cement

s. ASTM C1260 Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

t. ASTM C1293 Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction

u. ASTM C1567 Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)

v. ASTM C1602 Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete

w. ASTM E329 Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.04 SUBMITTALS

A. Test Reports

1. Provide reports by testing agencies meeting ASTM E329.

B. Design Data for Each Concrete Mixture

1. Submit at minimum 14 days before initial placement of concrete.

    a. Proportions for all ingredients, 28-day design compressive strength, water to cementitious materials ratio, admixture dosages, slump, and air content.

    b. Test data supporting proportions based upon laboratory trial batches or field test records per ACI 301 Section 4, Concrete Mixtures.

        1) Field test data used to determine the standard deviation used for establishing the required average design strength shall be from within the previous 12 months, per ACI 301.

        2) Field test data documenting that the proposed concrete proportions will produce an average compressive strength equal to or greater than the required average compressive strength shall be from within the 12 months.

        3) Laboratory trial batch data shall be from within the previous 24 months.

2. Cement: Certified mill reports, not older than 90 days.

3. Supplementary cementitious materials: Source and test reports for actual material to be used in the Work, not older than 90 days.

    a. Fly ash

    b. Ground granulated blast-furnace slag

4. Aggregate

    a. Data not older than 90 days, except test data for soundness, abrasion, and alkali reactivity - not older than 1 year.

    b. Fine and coarse aggregate data, except as noted

        1) Sources

        2) Specific gravity

        3) Sieve analyses per ASTM C33 (including fineness modulus of fine aggregate)

        4) Organic impurities for fine aggregate per ASTM C40

5) Potential alkali reactivity (not required if a cement containing less than 0.60 percent alkalis is used, per ASTM C33) per ASTM C1260, ASTM C1293, or ASTM C1567

6) Soundness per ASTM C88

7) Abrasion for coarse aggregate per ASTM C131 and ASTM C535

5. Product Data and Instructions

a. Admixtures

6. Certificates

a. Plant certification: Concrete plant certified by the National Ready Mixed Concrete Association.

7. Sample Batch Ticket

a. Sample blank batch ticket from concrete batch plant

C. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection for Material for On Site Batching

1. Carefully store cement immediately upon receipt in a weatherproof structure, as airtight as practical to prevent moisture absorption, stacked closely to reduce air circulation, but not against exterior walls. Allow easy access for inspection and shipment identification.

2. Transfer bulk cement to elevated airtight weatherproof bins. Test quality of cement that has been stored for suitability if quality is questionable and do not use without approval.

3. Store aggregates to prevent contamination by foreign materials and in separate piles by size. Build coarse aggregate stockpiles in horizontal layers not exceeding 4 feet in depth to avoid segregation.

PART 2 – PRODUCTS

2.01 SOURCE

A. Provide concrete supplied from a single commercial ready-mix plant, mixed and delivered in accordance with the requirements of ASTM C94, except if plant does not exist within a reasonable distance from Site, furnish material for on-Site batching.

2.02 CONCRETE MATERIALS

A. Concrete mixture design

1. Per ACI 301, Section 4, Concrete Mixtures.

2. 28-day design compressive strength: 4,000 pounds per square inch, except as otherwise specified.

3. Water to cementitious materials ratio: Not to exceed 0.45 except as otherwise specified.

4. Provide designs of required strength, water to cementitious materials ratio, slump, and workability for placing conditions and specified finishes without segregation.

5. Slump

   a. Per ASTM C143.

   b. Specified Slump Range

      1) 3 inches to 5 inches

   c. Specified Slump Range (mixes with mid-range water reducer)

      1) 2 inches to 4 inches, before admixture is added

      2) Maximum 6 inches, after admixture is added

   d. Specified Slump range (mixes with high-range water reducer)

      1) 2 inches to 4 inches, before admixture is added

      2) Maximum 8 inches, after admixture is added

B. Cement: per ASTM C150, Type II or ASTM C595 IP (MS), IS (<70)(MS). Do not use ASTM C595 cements that contain ASTM C1157 cement.

C. Supplementary cementitious materials

1. Fly ash (optional)

   a. ASTM C618, Class F

   b. Maximum loss of ignition: 3.0 percent

   c. Not less than 15 percent or more than 25 percent of weight of cement plus fly ash

2. Ground-granulated blast furnace (GGBF) slag (optional)

   a. ASTM C989

   b. Activity classification: Grade 100 or 120

c. Not less than 25 percent or more than 50 percent of weight of cementitious material

3. Fly ash plus GGBF slag

a. Maximum 50 percent of total cementitious materials

b. Fly ash portion maximum 25 percent of total cementitious materials

c. Minimum portland cement: 337 pounds per cubic yard of concrete

D. Aggregate

1. Meet ASTM C33, as amended herein. Evidence of a satisfactory service record in lieu of testing for alkali reactivity is not permitted.

2. Do not use crushed hydraulic cement concrete for aggregate.

3. Aggregate reactivity testing: per ASTM C1260. Do not use aggregate having a 14-day expansion greater than 0.10 percent (considered potentially reactive), except if tested per ASTM C1567, the 14 day expansion is not greater than 0.10 percent, or if tested per ASTM C1293, the 2-year expansion is not greater than 0.04 percent, or if cement containing less than 0.60 percent alkalis is used per ASTM C33.

4. Fine aggregates: Sand or screenings of gravel or crushed stone, well graded from fine to coarse; clean and free from soft particles, clay, loam and organic matter, with the volume removed by sedimentation not more than 3 percent.

a. Organic impurities testing: per ASTM C40. Color of the supernatant liquid above the test Sample, not darker than organic plate No. 3.

b. Grading

U.S. Standard Sieve	Percent Passing
Size 3/8 inch	100
No. 4	95 - 100
No. 8	80 - 100
No. 16	50 - 85
No. 30	25 - 60
No. 50	5 -30
No. 100	0-10

c. Not more than 45 percent retained between any 2 consecutive sieves listed above. Fineness modulus, not less than 2.3 nor more than 3.1.

5. Coarse Aggregates: Crushed stone or washed gravel of clean, hard, durable, uncoated particles, free from dust, dirt, or other deleterious substances, and free from thin, flat, or elongated particles.

a. Nominal maximum aggregate size for slabs poured on ground, at least 15 inches thick, except where clear spacing between reinforcing bars is less than 2 inches: 1-1/2 inches.

b. Nominal maximum aggregate size at all other locations, except as specified otherwise or approved: 3/4 inch.

c. Nominal maximum aggregate sizes per grading in Table 2 of ASTM C33: No. 467 (1-1/2 inches), No. 57 (1 inch), No. 67 (3/4 inch), No. 7 (1/2 inch), and No. 8 (3/8 inch).

E. Admixtures

1. Air-entraining admixture

a. Per ASTM C260 and chloride free

b. Provide air entrainment, except as noted below, per manufacturer's directions and this Specification to produce the following total entrained air content determined per the procedure in ASTM C173 or ASTM C231.

Nominal Maximum Size Coarse Aggregate (inches)	**Air Content By Volume (percent plus or minus 1.5)**
3/8	7.5
1/2	7.0
3/4	6.0
1	6.0
1-1/2	5.5

c. Maximum air content for interior concrete slabs to be hard-troweled: 3.0 percent.

2. Mid-range water reducing agents: per ASTM C494, Type A, and with consideration of the air entraining effect of the water reducing agent.

3. Water reducing-retarding agents: For use when ambient temperature above 70 degrees F, replace water reducing agent in whole or part with water reducing-retarding agent meeting ASTM C494, Type D. Use amounts to

produce concrete with set time equal to that at 70 degrees F without the retarder.

4. Set accelerator: Non-chloride type conforming to ASTM C494, Type C or E where allowed under Section 03 30 20.

5. High-range water reducing agent: ASTM C494, Type F or G (added in plant or field).

F. Water

1. Meet ASTM C1602.

2. Fresh and free from oil, acid, salt, alkali, sewage, organic matter, and other deleterious substances.

3. The amount of water carried on the aggregate and the effect of admixtures is included in the water content. Provide that water carried on the aggregate is determined periodically by test and the amount of free water on the aggregate subtracted from water added to the mixture.

4. Residual, wash, or other water in drums: Completely discharged prior to concrete batching (drums backed out).

5. Maximum amount of water required to produce a plastic mixture of the strength and water to cementitious materials ratio specified and the required density, uniformity and workability. Consistency of mixture required for the specific placing conditions and methods.

6. Slump adjustment: Not made at wash down, slump rack, or by any other means prior to arrival at point of delivery at the Site.

7. Water added after arrival at Site: Accurately metered and recorded on the batch ticket.

PART 3 – EXECUTION

3.01 ON-SITE BATCHING PLANT

A. Provide on-site batching plant, if applicable.

B. Provide bins with adequate separate compartments for fine aggregates and for each required size of coarse aggregate. Design each compartment to discharge efficiently and freely into weighing hopper. Provide means of control so that material may be added slowly and shut off with precision as the quantity desired in the weighing hopper is approached.

C. Construct weighing hoppers to eliminate accumulation of materials and to discharge fully. Provide beam type or the springless-dial type scales for weighing

aggregates and cement, accurate within 1/2 of 1 percent under operating conditions. Maintain ten 50-pound weights at the plant for checking accuracy.

1. Provide means for beam type scales to alert operator that required load in the weighing hopper is being approached within the last 200 pounds of load and within 50 pounds overload. Provide weighing and indicating devices are in full view of the operator and convenient access to controls while charging the hopper.

D. Keep exposed fulcrums, clevises, and similar working parts of scales clean.

3.02 FIELD QUALITY CONTROL

A. Advise testing laboratory and field observers minimum 24 hours in advance of placing concrete to allow for scheduling observation and testing.

B. Assist testing laboratory and Engineer in obtaining and handling Samples at the Site and other sources of material.

C. Provide space and electrical power at the Site for facilities to be provided by testing agency for proper initial curing and storage of concrete test cylinders to be lab-cured as required by ASTM C31 for 48 hours after casting. For cylinders to be field-cured: per Section 03 30 20.

D. Testing agency to store cylinders to be lab-cured at 60 degrees F to 80 degrees F in an environment preventing moisture loss from the specimens such as storage in wooden boxes, and placement in damp sand pits. Shield specimens from direct sunlight and radiant heating devices. Control storage temperature by use of heating and cooling devices as necessary and record temperature with a maximum-minimum thermometer.

END OF SECTION

TECHNICAL SPECIFICATIONS
SECTION 03 30 20
CONCRETE PLACING, CURING, AND FINISHING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide placing, curing and finishing of cast-in-place concrete accordance with this Section.

2. Concrete sampling and field testing by an independent technician certified in accordance with the requirements of ACI Concrete Field Testing Technician – Grade 1 certification program, or the requirements of ASTM C1077. Paid for by Contractor.

3. Laboratory testing of concrete cylinders by an independent, accredited and certified testing laboratory. Paid for by Contractor.

B. Related Requirements

1. Section 03 11 00 Concrete Forming

2. Section 03 16 00 Concrete Specialties

3. Section 03 30 00 Cast-In-Place Concrete

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Supplemental Specification Section 102.

1.03 REFERENCES

A. Reference Standards

1. AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

   a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary

   b. ACI 301 Specifications for Structural Concrete

   c. ACI 306.1 Standard Specification for Cold Weather Concreting

   d. ACI 308.1 Standard Specification for Curing Concrete

   e. ACI 306R Cold Weather Concreting

2. ASTM INTERNATIONAL (ASTM)

a. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field

b. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

c. ASTM C42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

d. ASTM C143 Standard Test Method for Slump of Hydraulic-Cement Concrete

e. ASTM C144 Standard Specification for Aggregate for Masonry Mortar

f. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete

g. ASTM C172 Standard Practice for Sampling Freshly Mixed Concrete

h. ASTM C173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

i. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

j. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

k. ASTM C404 Standard Specification for Aggregates for Masonry Grout

l. ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation

m. ASTM C881 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

n. ASTM C920 Standard Specification for Elastomeric Joint Sealants

o. ASTM C1064 Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete

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

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

r. ASTM D1751 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

s. ASTM D1752 Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion

t. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials

u. ASTM D2240 Standard Test Method for Rubber Property - Durometer Hardness

v. ASTM E1155 Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers

w. ASTM E1745 Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

B. Definitions

1. Construction joint refers to a monolithic construction joint in which the surface between successive placements is prepared to enhance bond and shear transfer and reinforcement is continuous.

1.04 SUBMITTALS

A. Product Data and Manufacturer's Instructions

1. Delivery Tickets

a. Provide duplicate delivery tickets at time of delivery for each truckload of concrete delivered

b. Serial number of ticket

c. Date and Project location

d. Name and location of ready mixed concrete plant

e. Truck number, time loaded, cubic yardage delivered

f. Dispatcher's name

g. Mixture design, cement type, and admixtures with brand names

h. Types and quantities of cement, fly ash and/or slag (if included in approved mix design) and admixtures. Quantities of water and fine and coarse aggregate including moisture content, and nominal maximum aggregate size

i. Water added subsequent to plant batching, if any. (Only applicable if total water per mixture design is not added at plant. Addition of water such that the water content of the approved mixture design is exceeded will be strictly prohibited.)

j. Concrete temperature upon delivery

k. Unloading time and location

2. Curing Paper

3. Epoxy Bonding Compound

4. Evaporation Retardant

5. Curing and Sealing Compound

B. Source and Field Quality Control Submittals

1. Methods to be used to protect concrete placed during cold weather. The Engineer's review shall not constitute approval as the Contractor shall be responsible for the protection of concrete placed during cold weather.

2. Methods to be used to protect concrete placed during hot weather. The Engineer's review shall not constitute approval as the Contractor shall be responsible for the protection of concrete placed during hot weather.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protection

1. Provisions shall be made for maintaining new concrete in a continuously moist condition for at least seven days after placement

2. Fresh concrete shall be protected from freezing, premature drying, flowing water, and mechanical injury

3. Concrete shall not be placed while rain, sleet, or snow is falling unless acceptable protection is provided. Precipitation shall not be allowed to enter into the concrete mix or damage concrete surfaces

PART 2 – PRODUCTS

2.01 CURING PAPER

A. Curing Paper: Conform to ASTM C171, for regular or white waterproof paper.

2.02 CURING AND SEALING COMPOUND

A. Curing and Sealing Compound for Concrete Slabs, Pads, and Stairs: Provide clear vinyl toluene acrylic silane polymer blend equal to Certi-Vex Guard Clear by Vexcon Chemicals, a one-step cure and penetrating water repellent sealer.

B. Performance Requirements

1. VOC: < 700 grams/liter

2. Meets or exceeds ASTM C1315, TYPE 1, CLASS A, NCHRP-244, ASTM C309 Type 1 Class A & B, and AASHTO M148 Type 1 Class A & B.

3. ASTM E96 Water Vapor Permeability – 94%

4. ASTM C457 Depth of Penetration: 0.18” to 0.21”

5. ASTM C642 Water Absorption Reduction in Hardened Concrete = 89%

6. NCHRP 244 Series IV Reduction of Absorbed Chloride into Concrete > 85%

7. Meets OSHA/ADA non-slip requirements

8. USDA approved

2.03 EPOXY BONDING COMPOUND

A. Epoxy Bonding Compound: Conform to ASTM C881, contain 100 percent solids, and be moisture tolerant. Sikadur 32 Hi-Mod or Sikadur 32 Hi-Mod LPL, by Sika Corporation; Sure-Bond (J-58, or J-58 LPL), by Dayton Superior; or approved equal shall be provided.

2.04 EVAPORATION RETARDANT

A. Evaporation Retardant: water based polymer liquid placed on fresh concrete to control the rate of evaporation and extend workability. E-CON as manufactured by L&M Construction Chemicals, Inc.; SikaFilm by Sika Corporation; MasterKure ER 50 by Master Builders; or approved equal.

PART 3 – EXECUTION

3.01 CONCRETE PLACEMENT AND JOINTING

A. Tolerances: Tolerances shall conform to all requirements of ACI 117 except as modified.

B. Cold Weather Requirements

1. Cold weather concreting provisions shall be followed during cold weather: any and all periods when for more than three consecutive days the average daily outdoor temperature drops below 40 degrees F. (The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight.) When temperatures higher than 50 degrees F occur during more than half of any 24-hour duration, the period shall not be regarded as cold weather.

2. When freezing temperatures may occur during periods not defined as cold weather, concrete surfaces shall be protected against freezing for at least the first 24 hours after placing.

3. Concrete shall not be placed on frozen subgrade. Insulate or heat subgrade to ensure temperature above 32 degrees F when concrete is placed.

4. All embedment’s having a cross sectional area of 1.0 square inch or greater, and including #9 reinforcing bars, shall be at a temperature not less than 10 degrees F at time of concrete placement.

5. Thermal protection must be provided immediately after concrete placement. Procedures for covering, insulating, housing, and/or heating concrete shall be prearranged. Except when supplemental heat is provided, the R-value of the insulation shall be per the recommendations of chapter 9 of ACI 306R.

6. Accelerating admixtures shall be approved at the Engineer's discretion, however those containing calcium chloride shall not be permitted

7. When combustion heaters are used, flue gases shall be vented to the exterior of enclosures

8. Concrete shall be placed and maintained at the following minimum concrete placement temperatures (measured at concrete surface)

    a. Sections of less than 12-inch minimum dimension: 55 degrees F

    b. Sections of 12 to 36 inches minimum dimension: 50 degrees F

9. The concrete placement temperature shall not be higher than the minimum concrete placement temperature by more than 20 degrees F

10. The minimum concrete temperature as mixed shall be: 5 degrees F higher than the minimum concrete placement temperature when the air temperature is above 30 degrees F; 10 degrees F higher when the air temperature is between 0 and 30 degrees F; and 15 degrees F higher when the air temperature is less than 0 degrees F

11. The temperature shall be monitored at the surface of the concrete, including at corners and edges, which are more vulnerable to freezing. The concrete surface temperature and the corresponding outside air temperature shall be recorded a minimum of twice per each 24 hour period

12. Concrete shall be maintained at the minimum specified temperatures for a protection period of 6 days. When an approved accelerating admixture is used the protection period may be reduced to 4 days.

13. Slabs, regardless of air content, shall not be exposed to freezing temperatures when exposed to rain, snow or other water sources, prior to reaching a compressive strength of 3,500 psi. For hard-troweled slabs (which have a maximum air content of 3.0 percent) see Article 3.07, paragraph D.3 for additional requirements.

14. Concrete shall be cooled gradually at the end of the protection period. The maximum allowable temperature drop at the concrete surface during the first 24 hours after the protection period shall be: 50 degrees F for

concrete sections of less than 12-inch minimum dimension; and 40 degrees F for concrete sections of 12 to 36 inch minimum dimension.

C. Hot Weather Requirements

1. The temperature of the concrete when placed shall not exceed 90 degrees F. When the air temperature is 90 degrees F and above, procedures to cool mixture ingredients may be warranted. These include: providing shaded storage for aggregate, frequent sprinkling or fog spraying of coarse aggregate, and using chilled batch water and/or ice. Forms and reinforcement shall be sprinkled with cold water just prior to concrete placement. When possible, placement of slabs should be scheduled after walls and roof structure are in place in order to minimize problems associated with direct sunlight and/or drying winds. Newly placed concrete shall be protected from the direct sunlight.

2. Records shall be maintained of: time and location of concrete placement, air temperature, weather conditions (i.e. calm, windy, clear, and/or cloudy), relative humidity, and concrete temperature as delivered and after placement.

3. When the air temperature is 90 degrees F and above: the time between the addition of water to cement or cement to aggregate (whichever occurs first) and the time of concrete placement shall not exceed 60 minutes, except upon approval of the Engineer when all tests for air content, slump and temperature are acceptable.

D. Placing

1. Concrete shall be handled from the truck to the place of final deposit as rapidly as practicable by methods preventing segregation and/or loss of ingredients.

2. The time between the addition of water to cement, or cement to aggregates (whichever occurs first), and the placement of concrete shall not exceed 90 minutes. When air temperature is 90 degrees F and above, this time shall be reduced to 60 minutes. These times may be exceeded only upon approval of the Engineer, and only if all tests for air content, slump, and temperature are also acceptable.

3. Water shall be removed from all forms and excavations and the Work shall be kept dry during placement. No water shall be thrown on, allowed to flow over, or rise upon the concrete until it is thoroughly set.

4. Prior to placement of slabs on soil, the subgrade shall be moist with no free water and no muddy or soft spots.

5. The concrete shall be directly deposited as close as possible to its final location, and shall be deposited in such manner so as to maintain a homogeneous, plastic, approximately horizontal surface.

6. Where concrete may contact soil while being placed, free fall shall be limited to a maximum of 3 feet. Concrete that has been contaminated by soil and/or other foreign matter shall be rejected. The accumulation of concrete on the forms and/or on reinforcement above the level of placement shall be avoided. The splashing of concrete upon formwork that is set for a subsequent concrete placement shall be prevented due to the resulting marks on the finished concrete.

7. Re-tempering of concrete and concrete placement against partially hardened concrete shall not be permitted. A concrete placement, once started, shall be carried out as a continuous operation until the placement of the entire section between construction joints is complete.

E. Runways: Runways shall be provided for wheeled concrete handling equipment which shall not be wheeled over reinforcement. Runways shall not be supported upon reinforcement that is part of the Work.

F. Chuting

1. Minimum slope shall be 3 horizontal to 1 vertical and maximum slope shall be 2 horizontal to 1 vertical. Between these limits, the slope shall be that which will prevent segregation and ensure continuous flow.

2. A baffle shall be provided at the end of the chute to prevent segregation. If the end of the chute is more than 3 feet above the surface of deposit, a spout shall be used. The spout shall be kept full of concrete with the end kept as near as practical to the surface of deposit.

3. The chute shall be steel or steel lined, and sections shall have the same slope throughout. Aluminum chutes are not permitted.

4. The chute shall be thoroughly flushed with water before and after each use, the water discharged outside the forms. CHUTE MAY NOT BE FLUSHED INTO SOPER MILL BROOK.

G. Pumping: The inside diameter of pipes and hoses used to convey the concrete shall be a minimum of three times the maximum size aggregate of the mixture. In order to minimize altering the concrete properties, long vertical sections at the end of the pump line shall be avoided. A horizontal hose run, a hose loop, or a slide gate at the end of the hose may be used to reduce loss of entrained air.

H. Compaction

1. Provide at least one standby vibrator, and at least one for each three in use.

2. Concrete may be deposited in one or multiple layers. Each layer shall be compacted by mechanical internal vibrating equipment supplemented by hand spading, rodding, and tamping as required. The depth of each layer shall not exceed the smaller of 36 inches and the depth that can be properly vibrated with the equipment used. When deposited in multiple layers, the vibrator shall penetrate the previous layer approximately 6 inches. Ensure initial setting of the previous layer does not occur prior to placement of subsequent layer.

3. Vibrators shall be relocated frequently, and over-vibration resulting in segregation shall be prevented. Vibrators shall not be used to move concrete within the forms. Concrete shall be thoroughly consolidated around reinforcement, embedments, and into the corners of the forms.

4. Ensure that vibrator is kept several inches clear of waterstops.

5. Where internal vibration is impractical, the use of form vibrators will be considered, and will be allowed only with the Engineer's written approval. When allowed, the vibrator shall be placed so that motion is horizontal

I. Construction Joints

1. Construction joints shall be located where shown on the Drawings, or, if not shown, locations shall be approved by the Engineer. Where required to be watertight, waterstops as specified in Section 03 11 00 CONCRETE FORMING shall be used.

2. Horizontal construction joints: laitance shall be removed immediately after initial set and the surface shall roughened in an acceptable manner that exposes the aggregate uniformly and doesn't leave laitance or loose aggregate. After the concrete has set to a degree that precludes laitance removal by shovels or scrapers, the Contractor shall remove it, and create a roughened surface, by water jetting or other effective method. The use of pneumatic hammers is not permitted.

3. Vertical construction joints: the surface shall be thoroughly cleaned of laitance by water jetting, or by wire brushing followed by air blasting.

4. Before concrete is placed against set concrete, the surface shall be thoroughly wetted with standing water removed. Horizontal construction joints shall be in a saturated surface dry condition: saturated for a minimum of 6 hours, with standing water removed.

5. Where noted on the Drawings, and as approved by the Engineer where an unplanned interruption within a concrete placement has occurred, epoxy-bonding compound shall be used in accordance with the manufacturer's instructions.

6. Reinforcement shall be continuous at construction joints unless otherwise shown on the Drawings. Waterstops shall be provided where called for in the Contract Documents. All necessary precautions to ensure that the waterstop is properly located and aligned and remains so during concrete placement shall be taken. In the event that the waterstop is improperly located, allowing a tolerance of plus or minus 1/2-inch, the Engineer may order the waterstop extended, or replaced, or such other action as deemed necessary, and at no additional cost to the Owner.

J. Existing Concrete

1. Where concrete is placed against existing concrete, the following surface preparation shall be required.

2. The existing concrete surface shall be cleaned of all contamination and debris, and roughened by steel shot blasting, abrasive (sand) blasting, or water jetting (hydrodemolition). Use of scabblers, scarifiers, bush hammers, or pneumatic hammers is not permitted.

3. The existing concrete surface shall be water-saturated for a minimum of six hours, after which the excess water shall be removed immediately prior to placement of new concrete.

4. Apply epoxy-bonding compound to prepared concrete surface prior to concrete placement.

3.02 CURING AND PROTECTION

A. Temperature

1. When the ambient temperature falls below 40 degrees F or rises above 95 degrees F, a record shall be kept of concrete temperatures and of protection given to concrete during placement and curing.

2. The temperature of in-place concrete shall be the surface temperature of the concrete. The surface temperature may be determined by placing temperature sensors in contact with concrete surfaces or between concrete surfaces and covers used for curing, such as insulation blankets or plastic sheeting.

B. Curing

1. Provide curing per ACI 308.1 except as modified.

2. During cold weather, as previously defined, the application of water shall not be required. Curing shall be accomplished by the use of curing paper, curing compounds, cure and seal compounds, or other approved methods. Thermal blankets are not an approved curing method and shall be used in conjunction with curing provisions previously stated.

3. Provisions shall be made for maintaining new concrete in a continuously moist condition for a minimum of 7 days. Curing shall commence as soon as possible after final finishing when it will not mar, erode, or stain the concrete surface.

4. Curing shall be accomplished by the use of curing paper, curing compounds (except as noted below), wet methods (ponding, fog spray, damp sand or burlap, sprinkling, soaker hoses) or other methods.

5. Water used for curing shall be no more than 20 degrees F cooler than the concrete surface temperature.

6. Concrete slabs to receive a coating or bonded finish, including chemical hardeners, that aren't wet cured, shall be covered with curing paper as specified, laid with side joints lapped 4 inches and end joints lapped 6 inches. Paper shall be applied no earlier than 24 hours and no later than 30 hours after finishing the slab and shall be left in place at least seven days. (Wet methods shall be used for the first 24-30 hours.) The slab surface shall be maintained in a wet condition beneath the paper at all times. Joints shall be taped and paper shall be weighted to prevent displacement. Tears during the first 7 days after a slab is completed shall be immediately repaired.

7. Curing paper shall also be used to protect newly poured concrete floors from damage. Where heavy tools and/or equipment may be used, provide additional protection as required. Only light traffic will be permitted until 7 days after concrete placement. Slabs shall be protected from damage for the Contract duration, with any and all damage repaired by the Contractor at no additional cost to the Owner.

8. The use of a curing compound or cure and seal compound on surfaces to receive applied toppings, chemical hardeners, water repellents, coatings, or a rubbed or bonded finish will not be allowed. Where used, curing compound shall be applied immediately following the disappearance of the surface water sheen after the final finishing pass for slabs, and immediately upon removal of forms for formed concrete. Apply two coats per manufacturer’s installation instructions. Apply each coat uniformly with no gaps in coverage. If applied by spray, provide additional spray tank and spray nozzles as required to provide uninterrupted application of product. Cure and seal compounds have high solid content and shall be applied by trays and rollers, if application by spray tanks is not completed in a timely manner and to the satisfaction of the engineer.

9. Soaker hoses shall be used at tops of walls and columns before forms are removed. Wood forms shall be kept continuously wet in hot weather.

3.03 DEFECTIVE CONCRETE

A. The Engineer may direct the Contractor to remove and replace, at no additional cost to the Owner, concrete Work that is not formed as shown and/or specified in the Contract Documents, that contains a defective surface, or is hollow, delaminated, or otherwise unsound.

B. Upon the Engineer's approval, minor imperfections may be patched as specified herein.

3.04 REPAIR OF SURFACE DEFECTS AND PATCHING

A. After form removal, all form ties shall be cut off, all fins and irregularities removed, and all defective areas, holes, honeycombs, cavities and irregularities shall be repaired where surface finish defects exceed the finish tolerances of Section 3.05.

B. Exposed patchwork shall match adjacent finish and shall include a sack rubbed finish to blend repair into adjacent surfaces, and cured and protected as specified for concrete.

C. Filling Form Tie Holes: Tie holes shall be filled solid with non-shrink grout, specified in Section 03 16 00 CONCRETE SPECIALITIES, in the same manner as specified under patching above.

3.05 FINISH OF FORMED SURFACES

A. General

1. Concrete surfaces "exposed to view" shall be defined as those exposed to view upon completion of the Work, whether or not a painted finish is specified. Surfaces which will be covered by fill, such as exterior faces of walls, shall not be considered exposed to view.

2. Surface tolerance classes indicated herein are specified in ACI 117, and include abrupt surface irregularities that are measured within 1-inch of the irregularity, and gradual surface irregularities measured as the maximum gap between the concrete and the near surface of a 5-foot straight-edge, measured between contact points.

B. Surface Finish – 1.0 (SF-1.0)

1. SF-1.0 shall be provided for formed surfaces not exposed to view for concrete not containing liquids and/or gases, and not below design groundwater elevation.

2. Patch voids larger than 1 1/2-inch wide or 1/2-inch deep.

3. Remove projections larger than 1-inch.

4. Tie holes need not be patched.

5. Surface tolerance Class D, with formed surface irregularities not more than 1-inch.

C. Surface Finish – 2.0 (SF-2.0)

1. SF-2.0 shall be provided for formed surfaces not exposed to view for concrete not containing liquids, and/or gases, and below design groundwater elevation.

2. Patch voids larger than 3/4-inch wide or 1/2-inch deep.

3. Remove projections larger than 1-inch

4. Fill Tie holes

5. Surface tolerance Class D, with formed surface irregularities not more than 1-inch.

D. Surface Finish – 3.0 (SF3.0)

1. SF-3.0 shall be provided for formed surfaces exposed to view, for exterior face of walls to receive dampproofing per Specification 07 10 00, and for concrete not containing liquids, and/or gases.

2. Patch voids larger than 1/2-inch wide or 1/4-inch deep. For surfaces to receive dampproofing, patch all voids per the dampproofing manufacturer's written installation instructions.

3. Remove projections larger than 1/8-inch. For surfaces to receive dampproofing, remove all projections per the dampproofing manufacturer's written installation instructions.

4. Fill tie holes.

5. Surface tolerance Class C, with formed surface irregularities not more than 1/2-inch.

E. Environmental Surface Finish-1.0 (ESF-1.0)

1. ESF-1.0 shall be provided for exterior and interior formed surfaces of concrete tanks containing liquids or gases.

2. All exterior formed surfaces to receive grout-cleaned rubbed finish, unless noted otherwise on drawings.

3. Patch voids larger than 1/2- inch wide or 1/4-inch.

4. Remove projections larger than 1/8-inch.

5. Fill tie holes.

6. Surface tolerance Class A, with formed surface irregularities not more than 1/8-inch.

F. Grout-cleaned rubbed finish (Sack-Rubbed)

1. All interior and exterior concrete surfaces that are exposed to view shall receive a grout-cleaned rubbed finish and shall have a smooth and even surface, free of bug holes, when completed, unless specifically noted otherwise on drawings or herein.

2. Interior faces of tank walls concealed by aluminum panel system or concrete slabs shall not require grout-cleaned rubbed finish.

3. Wet the surface, and apply a thin coat of medium consistency neat cement slurry to the concrete surface by means of bristle brushes to provide a bonding coat. Before the slurry has dried or changed color, grout comprising one part cement to 1 1/2 parts sand meeting ASTM C144 or ASTM C404, with sufficient water to produce the consistency of thick paint, shall be applied and scrubbed into voids, with excess removed. The cement shall be that used in the concrete mix adjusted with white cement as necessary to match color of exposed concrete. Grout shall be applied with slightly damp pads of coarse burlap approximately 6 inches square used as a float, and shall be well scrubbed into the surface to provide a dense mortar.

4. The mortar shall be allowed to partially harden for 1 to 2 hours depending upon weather conditions. Work in direct hot sunlight shall be avoided. In hot dry conditions the concrete shall be kept damp during this period with a fine fog spray. Grout shall not be allowed to remain on the surface too long as it will become very difficult to remove. Grout shall not be left on the concrete overnight.

5. After the grout has hardened sufficiently, all that can be removed with a trowel shall be.

6. The surface shall then be allowed to dry thoroughly, and be rubbed vigorously with clean, dry burlap to completely remove any dried grout. There should be no visible film of grout remaining after rubbing.

7. The entire rubbing operation shall be completed in a single working day. Sufficient time shall be allowed for this.

8. On the following day, the concrete shall again be wiped clean with dry burlap to remove dust. The use of burlap containing old hardened mortar may be used since it will act as a mild abrasive. After this treatment, no build-up film should remain on the surface, but if it does, a fine abrasive

stone shall be used to remove it without breaking through the surface film of the parent concrete. Do not work up a lather.

9. After application of the surface grout, the surface shall be thoroughly washed down with stiff brushes and the concrete maintained in a continuously damp condition for at least three days above 50 degrees F by the periodic application of a fine fog spray, the use of damp fabric covered with polyethylene or other methods.

3.06 FINISHING OF RELATED UNFORMED SURFACES

A. Tops of exposed walls and similar unformed surfaces shall be struck off smooth and hand steel troweled to produce a smooth hard level surface. Line and elevation shall be pre-established by means of preset wood screeds, which shall be removed during the troweling operation.

B. After troweling is completed and after the curing period, the surface shall be dry honed to a smooth non-directional surface texture satisfactory to the Engineer.

3.07 FINISH OF SLABS

A. General

1. The evaporation retardant specified may be used in accordance with manufacturer recommendations to control plastic shrinkage cracking and as an aid in slab finishing operations. Conditions that may warrant its use include: high temperature, low humidity, high winds, and direct sunlight.

2. Loss of bleed water and surface drying shall be allowed to proceed naturally. Means to accelerate drying such as applying dry cement, sand, or other materials shall be prohibited.

B. Floor Flatness and Floor Levelness

1. Elevated floor slabs constructed on formwork and all concrete tank base slabs shall be true to the gradient and elevation shown on the Drawings. Flat Slabs shall be level with a tolerance of 1/8 inch in 10 feet. Sloped slabs shall be true to the gradient shown, within a tolerance of 1/8 inch in 10 feet. Slabs shall be pitched to drains as indicated on the Drawings.

C. Floated Finish

1. Slabs to receive a seamless floor finish or roofing, and all tank bottom slabs, shall receive a floated finish. Floating shall also precede a troweling, where a troweled finish is required as specified below. After consolidating, screeding, and leveling, the slab shall not be worked further until it is ready for floating.

2. Floating shall begin when the water sheen has disappeared, and when the slab has stiffened sufficiently to allow proper operation of a power-driven

float. Hand floating with wood, aluminum or magnesium floats shall be used at locations inaccessible to the power-driven float.

3. Surface trueness shall be verified at this stage with a 10-foot straightedge applied in multiple angles. High spots shall be cut down and low spots filled so that the finished surface is true. The slab shall then be immediately refloated to a uniform, smooth, granular texture.

D. Troweled Finish

1. All interior slabs left exposed shall receive a troweled finish.

2. The surface shall be finished with power floats as specified above for floated finish, followed by power trowels, and finally hand trowels. The first power troweling shall produce a smooth surface relatively free of defects but which may contain trowel marks. Subsequent trowel shall be by hand after the surface has sufficiently hardened. The surface shall be thoroughly consolidated by the hand troweling, and final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The finished surface shall be free of trowel marks and uniform in texture and appearance.

3. Interior concrete slabs to be hard-troweled shall have a maximum air content of 3.0 percent. After the curing period, they shall be protected from freezing temperatures for a minimum of 8 weeks. Thereafter, and for the duration of the Contract, if such slabs might be subject to freezing temperatures, they shall be fully sheltered from rain, snow and all other water sources.

4. Subsequent trowels shall be by hand after the surface has sufficiently hardened. The surface shall be thoroughly consolidated by the hand troweling, and final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The finished surface shall be free of trowel marks and uniform in texture and appearance.

E. A broom finish shall be provided for all exterior slabs, sidewalks, platforms, ramps, exterior stairs and as specified herein or shown on the Drawings. After floating, and between initial and final set, the surface shall be given a coarse transverse scored texture by drawing a broom across the surface.

F. After consolidating, screeding and leveling, the surface shall be roughened with stiff brushes or raked before final set. At sloped surfaces scratches shall be made parallel to the direction of slope, to facilitate subsequent cleaning.

G. A wood float finish, a broom finish with open pores, or a finish as otherwise required by the waterproofing manufacturer shall be provided for concrete slabs that will receive a wet slurry application of cementitious waterproofing.

3.08 CURING AND SEALING COMPOUND

A. Curing and sealing compound shall be applied for exposed to view concrete walls and footings. It shall be applied at a coverage rate recommended by the manufacturer. It shall be applied per the manufacturer's specifications after placement.

B. Apply first coat shortly after concrete finishing as directed.

C. Apply second coat near final completion after cleaning concrete surfaces of all construction-related contaminants.

3.09 CLEANING CONCRETE

A. Cleaning during progress of the Work shall not be permitted. Cleaning shall not commence until the structure is entirely completed.

B. Rust and other stains and discolorations shall be removed with a non-etching cleaning agent used in accordance with the manufacturer's instructions. Cleaning of all surfaces to receive a painted finish is also required.

C. Rust stains may be removed by applying a bleaching agent such as oxalic acid. Acid etching, sandblasting, or cleaning by other methods may be used as approved by the Engineer.

3.10 FIELD QUALITY CONTROL

A. General

1. During the progress of the Work, an independent, accredited and certified testing laboratory shall conduct concrete testing as specified herein, including the preparation and testing of concrete cylinders. All testing shall be paid for by the Contractor.

2. Field technicians in charge of sampling concrete; testing for slump, unit weight, air content, and temperature; and making and curing test specimens shall be certified in accordance with the requirements of ACI Concrete Field Testing Technician – Grade 1 certification program, or the requirements of ASTM C1077.

3. Scheduling: Contractor to advise testing laboratory and field technician(s) a minimum 24 hours in advance of placing concrete to allow for scheduling observation and testing.

4. Test Cylinder Storage: Provide space and electrical power at the Site for temperature controlled storage of concrete laboratory test cylinders to be standard cured per Specification 03 30 00. Temperature controlled storage containers to be provided by testing agency.

B. Field Testing and Sampling Procedures

1. Concrete samples shall be taken in accordance with ASTM C172 for slump, entrained air, unit weight, and strength tests.

2. Entrained air content and slump requirements are listed in Specification 03 30 00.

3. Air Content: Test in accordance with ASTM C173 or ASTM C231. Pumped concrete shall be sampled and tested for air content at the point of placement, as opposed to at the point of delivery. Upon the Engineer's approval: once the slump loss and the loss of entrained air due to pumping is established, correlated acceptance limits at the point of delivery, where sampling and testing may then be performed, shall be made applicable. When the pump line configuration is changed significantly, sampling and testing shall again be performed at the point of placement until new acceptance limits at the point of delivery may be determined.

4. Slump: Measured in accordance with ASTM C143 at the point of delivery.

5. Temperature shall be measured in accordance with ASTM C1064 at the point of delivery

6. Test Cylinders: Concrete cylinders shall be prepared in accordance with ASTM C31 and be 4 inches diameter by 8 inches tall. Refer to Article 3.11, part D for number of cylinders required.

    a. Lab-Cured (Standard Cured) Cylinders: Filed cured in temperature controlled storage per Specification 03 30 00. Cylinders shall be transported to the testing lab within 48 hours of forming, but not sooner than 8 hours after final set.

    b. Field Cured Cylinders: Cured in the field under conditions that are not more favorable than the most unfavorable conditions for the portions of the concrete that the cylinders represent.

C. Laboratory Testing of Test Cylinders

1. Cylinders shall be tested for compressive strength in accordance with ASTM C39.

2. Test concrete cylinders per Section 3.10, Part D.

3. The compressive strength shall be the average strength of three cylinder breaks per ASTM C39 and tested at 28-days.

4. Test Results: Submit test results to Engineer and concrete supplier within 24 hours of laboratory testing.

D. Field and Laboratory Testing Frequency

1. Minimum field testing frequency for each day concrete is delivered and placed at the project site shall be as follows.

a. Take concrete test cylinders at frequency stated herein from truckload determined by technician, contractor, or engineer

b. 1st truck load: Test air content, slump, and temperature.

c. 2nd and 3rd truck load: No testing unless noted otherwise.

d. 4th truck load: Test air content, slump, and temperature

e. 5th and 6th truck load: No testing unless noted otherwise

f. 7th truck load: Test air content, slump, and temperature.

g. Repeat test frequency for additional truckloads of concrete delivered during each day of concrete placement.

h. Concrete temperature shall be tested for each truckload of concrete during cold weather or hot weather as defined within this specification.

i. Contractor, Owner's representative, or Engineer shall increase testing frequency as required to verify mix designs, address workability concerns, and to ensure all concrete placed complies with specifications

2. Lab-Cured (Standard Cure) Cylinders

a. Lab-cured cylinders are required for all concrete on the project, and shall be in addition to field-cured cylinders, where provided.

b. One set of 5 cylinders shall be prepared for each 100 cubic yards, or fraction thereof, of each different mix placed in each single day; or for each 5,000 square foot of slab or wall surface area placed each day.

c. Test one cylinder at 7 days, three at 28 days, and reserve one cylinder for 56-days.

d. Test 56-day cylinder as needed or requested by Contractor or Engineer.

E. Acceptance Criteria and Additional Testing Requirements

1. Concrete strength shall be evaluated in accordance with ACI 301 Section 1.6.5, "Evaluation of concrete strength tests", and Section 1.6.6, "Acceptance of concrete strength"

2. Construction will be considered potentially deficient if concrete fails to meet any requirements that affect the strength and durability of the structure, including but not necessarily limited to

a. Low strength concrete per ACI 301, Section 1.6.5, "Evaluation of concrete strength tests", and Section 1.6.6, "Acceptance of concrete strength"

b. Water-to-cementitious materials ratio higher than that of the specified mix

c. Reinforcing steel size, quantity, strength, position or arrangement that does not meet the requirements of the Contract Documents

d. Reinforced concrete that differs from the dimensions or locations shown on the Drawings

e. Curing that does not meet the requirements of the Contract Documents, including premature formwork removal

f. Hot or cold weather concreting that doesn't meet the requirements of the Contract Documents

g. Mechanical damage from accidents or fire

h. Poor construction practices

F. The Engineer may order load and/or core tests in accordance with ASTM C 42. Such testing shall be paid for by the Owner if the concrete is proven to meet the requirements specified.

END OF SECTION

TECHNICAL SPECIFICATIONS
SECTION 09 90 00
PAINTING AND COATING

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. The following specification section includes, surface preparation and painting for the following types of painting work and as included in the schedule at the end of this Section and as indicated on the Drawings. All or a portion of the painting work indicated may be required as part of the Contract Documents:

1. Painting of previously-painted steel bridge support beams.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Supplement Specifications Section 102.

1.03 REFERENCES

A. Reference Standards

1. Steel Structures Painting Council (SSPC)

B. .

1.04 SUBMITTALS

A. Product Data

1. Primers

2. Manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.

3. Manufacturer's material data and certificates of performance for proposed substitutions.

4. List each material and cross-reference the specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.

B. Samples and Mockups: as specified in Article 1.06.

1. Provide Samples for initial color selection in the form of manufacturer's color charts. After color selection, furnish color chips of selections made for surfaces to be coated.

C. Certificates: From manufacturer that products supplied comply with local Regulations controlling use of volatile organic compounds (VOCs).

1.05 QUALITY ASSURANCE

A. Qualifications: as follows.

1. Engage experienced applicators who have completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information.

1. Product name or title of material

2. Product description (generic classification or binder type)

3. Manufacturer's stock number and date of manufacture

4. Contents by volume, for pigment and vehicle constituents

5. Thinning instructions

6. Application instructions

7. Color name and number

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees F. Maintain containers used in storage in a clean condition, free of foreign materials and residue. Protect from freezing.

C. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and Work areas are protected from fire and health hazards resulting from handling, mixing, and application.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Tnemec

B. Sherwin Williams

C. PPG

2.02 PAINT MATERIALS

A. Provide materials designated by item or area to be painted in Paint Schedules attached and on Drawings. Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers.

B. Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

C. Material compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

D. Material quality: Manufacturer's best-quality trade sale paint material of the various coating types specified. Ensure paint material containers display manufacturer's product identification.

E. Colors from the manufacturer's full range of standard colors.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Ensure surfaces receiving paint are thoroughly dry before paint is applied. Do not begin to apply paint until unsatisfactory conditions have been corrected.

B. Coordination of Work: Review other Specifications in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers. Notify the Engineer about anticipated problems using the materials specified over substrates primed by others.

3.02 PREPARATION

A. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Following completion of painting operations in each space or area, ensure workers skilled in the trades involved reinstall items.

B. Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and re-prime. Notify Engineer in writing about anticipated problems using the specified finish-coat material with substrates primed by others.

2. Ensure existing painted surfaces are structurally sound, dry, clean, and free of oil, grease, dirt, mildew, form release agents, curing compounds, efflorescence, loose and flaking paint, or other foreign material. Engineer will approve condition of prepared substrate prior to application of coating system. Test old coatings for lifting per coating manufacturer's recommendations.

3. Cementitious materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen, as required, to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

   a. Use abrasive blast-cleaning methods if recommended by the paint manufacturer.

   b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

4. Ferrous Metals: Clean un-galvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, rust and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).

5. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Carefully mix and prepare paint materials according to manufacturer's directions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3. Use only thinners approved by the paint manufacturer and only within recommended limits.

3.03 COLOR SELECTION

A. Colors of finish coats: as indicated or specified or as selected by Engineer.

3.04 APPLICATION

A. General

1. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F and 90 degrees F.

2. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F and 95 degrees F.

3. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

4. Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

   a. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

   b. Paint colors, surface treatments, and finishes as indicated in the Paint Schedules.

   c. Provide finish coats that are compatible with primers used.

   d. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.

   e. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed

surfaces/fasteners, receive a dry film thickness equivalent to that of flat surfaces.

f. The term “exposed surfaces” includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.

g. Sand lightly between each succeeding enamel or varnish coat.

B. Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

C. Apply paints and coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.

1. Use brushes best suited for the material applied.

2. Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

3. Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

D. Apply materials no thinner than the manufacturers’ recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Ferrous metals indicated on the Drawings to be painted will be provided with a shop primer compatible with the coatings specified.

3.05 PRIME COATS

A. Before applying finish coats, apply a prime coat of material as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing. Apply prime coat to previously painted surfaces if finish coats are not compatible with existing coating.

3.06 PIGMENTED (OPAQUE) FINISHES

A. Completely cover to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

3.07 COMPLETED WORK

A. Match approved Samples for color, texture, and coverage. Remove, refinish, or repaint Work not complying with specified requirements.

3.08 CLEANING

A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the Site. Clean up debris resulting from Work and dispose in Project on-site trash receptacles.

B. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.09 PROTECTION

A. Protect Work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Engineer.

B. Provide Wet Paint signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their Work after completing painting operations.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.10 ATTACHMENTS

A. Paint Schedule

3.11 FIELD QUALITY CONTROL

A. Site/Field tests and inspections: May be required by Owner up to 4 times during the period when paint is being applied.

1. Engage the services of an independent testing agency with minimum 5 years of experience to sample the paint material used. Provide that Samples of material delivered to the Project are taken, identified, sealed, and certified in the presence of the Contractor.

2. The independent testing agency shall perform appropriate tests at no additional cost to the Owner for the following characteristics.

a. Quantitative materials analysis

b. Abrasion resistance

c. Apparent reflectivity

d. Flexibility

e. Washability

f. Absorption

g. Accelerated weathering

h. Dry opacity

i. Accelerated yellowness

j. Recoating

k. Skinning

l. Color retention

m. Alkali and mildew resistance

3. If test results show material being used does not comply with specified requirements, stop painting, remove noncomplying paint, repaint surfaces coated with rejected paint, and remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are incompatible.

END OF SECTION

PAINT SCHEDULE

Number of coats scheduled is as a minimum. Painting and finishing shall conform to applicable Laws and building code regarding fire hazard classifications and volatile organic content of finish materials. Provide products by the manufacturers named or approved equal.

Refer to the Drawings for areas to be painted.

Provide paint and coating systems listed below where the Drawings refer to this Specification section or reference any item to be painted or coated, unless a specific paint or coating system is specified elsewhere.

This list is intended to cover all potential conditions that may require painting and not all paint and coating systems listed below may not be included in the Work.

Exterior Previously-Painted Steel Surfaces

Surface Preparation:

All previously coated surfaces scheduled for painting shall initially be power washed in accordance with SSPC-SP12 (LP WC) WJ-4 Condition (5,000 psi), washing system containing a suitable solution of an environmentally approved cleaning agent to remove all soluble and insoluble surface contamination, including all chalk and mildew and be equipped with an oscillating tip. Same surfaces shall be clean water rinsed to remove all cleaning residue. Following cleaning procedures, hand and power tool clean any areas of bare metal in accordance with SSPC-SP3 Power Tool Cleaning, ensuring that any remaining lifted edges are feather back tight. Cleaned areas of bare metal shall be spot primed on the same day. (NOTE: If pressure washing is not feasible, surface should initially be cleaned in accordance with SSPC-SP1 Solvent Cleaning by hand or whatever means necessary, subject to approval by coatings manufacturer and Engineer.)

Field-Applied Prime Coat:

4. Tnemec "Series 1 Omnithane" at 2.5 – 3.5 mils DFT.
5. S-W Equivalent System
6. PPG Equivalent System

Field-Applied Intermediate Coat:

1. Tnemec "Series 27 Typoxy" at 2.0 – 3.0 mils DFT.
2. S-W Equivalent System
3. PPG Equivalent System

Field-Applied Finish Coat:

1. Tnemec "Series 73 Endura-Shield" at 2.0 – 3.0 mils DFT.
2. S-W Equivalent System
3. PPG Equivalent System