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SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.6	(2006) Safety & Health Program Requirements for Demolition Operations - American National Standard for Construction and Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 61	National Emission Standards for Hazardous Air Pollutants

1.2 PROJECT DESCRIPTION

This project consists of addressing distressed conditions of concrete on the exterior concrete staircase at the Intake Tower. Repairs include removing all unsound concrete substrate and repair with a polymer modified concrete repair material. Along with concrete repairs a water repellent penetrant will be intalled to all of the exterior stair concrete surfaces.

1.2.1 Definitions

1.2.1.1 Demolition

Demolition is the process of tearing apart and removing any feature of a facility together with any related handling and disposal operations.

1.2.1.2 Deconstruction

Deconstruction is the process of taking apart a facility with the primary goal of preserving the value of all useful building materials.

1.2.1.3 Demolition Plan

Demolition Plan is the planned steps and processes for managing demolition activities and identifying the required sequencing activities and disposal mechanisms.

1.2.1.4 Deconstruction Plan

Deconstruction Plan is the planned steps and processes for dismantling all or portions of a structure or assembly, to include managing sequencing activities, storage, re-installation activities, salvage and disposal mechanisms.

1.2.2 Demolition Plan

Prepare a Demolition Plan and submit proposed demolition, and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress. Coordinate Waste Management and disposal with Technical Point of Contact . Provide procedures for safe the work in accordance with EM 385-1-1. Plan must be approved by Technical Point of Contact prior to work beginning.

1.2.3 General Requirements

Do not begin demolition or deconstruction until authorization is received from the Technical Point of Contact . Remove rubbish and debris from the project site; do not allow accumulations of debris within the work area. The work
includes demolition and removal of resulting rubbish and debris. Remove rubbish and debris from Government property daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the Technical Point of Contact .In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.3 ITEMS TO REMAIN IN PLACE

Comply with FAR 52.236-9 to protect existing vegetation, structures, equipment, utilities, and improvements. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the Technical Point of Contact prior to performing such work.

1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or

other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas daily.

1.3.2 Facilities

Protect electrical and mechanical services and utilities. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.

1.4 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.5 AVAILABILITY OF WORK AREAS

Areas in which the work is to be accomplished will be available at contract award.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Demolition Plan; G, RO

Existing Conditions

SD-07 Certificates

Notification; G, RO

1.7 QUALITY ASSURANCE

Submit timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Notify the State's environmental protection agency and the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61, Subpart M. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSP A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

1.7.1 Dust and Debris Control

Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Vacuum and dust the work area daily. Waste shall

not be left in or around the Intake Tower.

1.8 PROTECTION

1.8.1 Traffic Control Signs

a. Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Technical Point of Contact prior to beginning such work.

1.8.2 Protection of Personnel

Before, during and after the demolition work continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the project site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.9 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair or replace items to be relocated which are damaged by the Contractor with new undamaged items as approved by the Technical Point of Contact .

1.10 VARIATIONS

Variations from contract requirements require Contracting Officer approval pursuant to contract Clause FAR 52.236-21 Specifications and Drawings for Construction, and will be considered where advantageous to the Government.

1.10.1 Considering Variations

Discussion of variations with the Contracting Officer before submission will help ensure that functional and quality requirements are met and minimize rejections and resubmittals. When contemplating a variation that results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out variations may cause the Government to require rejection and removal of such work at no additional cost to the Government.

1.10.2 Proposing Variations

When proposing variation, deliver a written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government. Include the DOR's written analysis and approval. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

Check the column "variation" of ENG Form 4025 for submittals that include

variations proposed by the Contractor. Set forth in writing the reason for any variations and note such variations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted variations.

1.10.3 Warranting that Variations are Compatible

When delivering a variation for approval, the Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.10.4 Review Schedule Extension

In addition to the normal submittal review period, a period of 14 calendar days will be allowed for the Government to consider submittals with variations

1.11 EXISTING CONDITIONS

Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Contracting Officer or the Contracting Officer's Representative showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs or electronic images with a minimum resolution of 3072 x 2304 pixels, capable of a print resolution of 300 dpi, will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document. Submit survey results to the Technical Point of Contact or the Contracting Officer's Representative.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing structures onsite for reuse. Disassemble existing construction scheduled to be removed for reuse. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Designate materials for reuse onsite whenever possible.

3.1.1 Structures

a. Remove existing structures to the limit shown on the drawings.

b. Demolish structures in a systematic manner from the top of the structure to the ground. Complete demolition work above each tier or floor before the supporting members on the lower level are disturbed. Demolish concrete and masonry walls in small sections.

3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.2.2 Disconnecting Existing Utilities

Remove existing utilities uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Technical Point of Contact . When utility lines are encountered but are not indicated on the drawings, notify the Contracting Officer prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the Technical Point of Contact .

3.1.3 Concrete

Saw concrete along straight lines to a depth of a minimum 1 inch. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete.

3.1.4 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using on-site materials when available. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Make finished surfaces of patched area flush with the adjacent existing surface and match the existing adjacent surface as closely as possible to texture and finish. Provide patching as specified and indicated, and include the following:

a. Concrete: Completely fill holes and depressions, caused by previous physical damage or left as a result of removals in existing walls to remain, with an approved patching material, applied in accordance with the manufacturer's printed instructions.

3.2 DISPOSITION OF MATERIAL

3.2.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, become the property of the Contractor and must be removed from Government property. Materials approved for storage by the Technical Point of Contact must be removed before completion of the contract. Title to materials resulting from demolition and deconstruction, and materials and equipment to be removed, is vested in the Contractor upon approval by the Technical Point of Contact .The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.2.2 Unsalvageable and Non-Recyclable Material

Dispose of unsalvageable and non-recyclable noncombustible material in the disposal area located by the contractor. Dispose of unsalvageable and non-recyclable combustible material off the site.

3.3 CLEANUP

Remove debris and rubbish from project site and similar excavations. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.4 DISPOSAL OF REMOVED MATERIALS

3.4.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable federal, state and local regulations as contractually specified in the Waste Management Plan.

3.4.2 Burning on Government Property

Burning of materials removed from demolished and deconstructed structures will not be permitted on Government property.

3.4.3 Removal from Government Property

Transport waste materials removed from demolished and deconstructed structures from Government property for legal disposal.

-- End of Section --

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DIVISION 03 - CONCRETE

SECTION 03 01 00

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02/18

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SECTION 03 01 00

REHABILITATION OF CONCRETE
02/18

PART 1 GENERAL

1.1 SCOPE

This specification governs the rehabilitation of structural concrete.

1.2 DEFINITIONS

1.2.1 Bracing

Temporary supplemental members used to avoid local or global instability during construction, evaluation, or repair that are intended to be removed after completion of construction.

1.2.2 Delamination

A planar separation in a material that is roughly parallel to the surface of the material.

1.2.3 Rehabilitation

Repairing or modifying an existing structure to a desired useful condition.

1.2.4 Repair

The reconstruction or renewal of concrete parts of an existing structure for its maintenance or to correct deterioration, damage, or faulty construction of members or systems of a structure.

1.2.5 Shoring

Props or posts of timber or other material in compression used for the temporary support of excavations, formwork, or unsafe structures; the process of erecting shores.

1.2.6 Termination Joint

The interface where a placement of repair material meets existing concrete, the edge of an expansion joint, or other existing surfaces.

1.2.7 Unsound Concrete

Concrete that is fractured, delaminated, spalled, deteriorated, defective, contaminated or otherwise damaged.

1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117	(2010; R2015) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 301	(2020) Specifications for Concrete Construction
ACI 347R	(2014; Errata 1 2017) Guide to Formwork for Concrete
ACI 503.2-503.4	(2010, R 2003) Three Epoxy Specifications
ACI 548.8	(2019) Specification for Type EM (Epoxy Multi-Layer) Polymer Overlay for Bridge and Parking Garage Decks
ACI 548.12	(2012) Specification for Bonding Hardened Concrete and Steel to Hardened Concrete with an Epoxy Adhesive
ACI 548.15	(2020) Specifications for Crack Repair by Epoxy Injection
ACI 548.16	(2021) Epoxy and Aggrehate High Friction Surface on Concrete - Specification
ACI MNL-66	(2020) ACI Detailing Manual

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE/SEI 37	(2015) Design Loads on Structures During Construction

ASTM INTERNATIONAL (ASTM)

ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM C33/C33M	(2023) Standard Specification for Concrete Aggregates
ASTM C109/C109M	(2023) Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens)
ASTM C157/C157M	(2017) Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete
ASTM C266	(2021) Standard Test Method for Time of Setting of Hydraulic-Cement Paste by Gillmore Needles

ASTM C348	(2021) Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
ASTM C387/C387M	(2023) Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar
ASTM C496/C496M	(2017) Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
ASTM C881/C881M	(2020a) Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C882/C882M	(2023) Standard Test Method for Bond Strength of Bonding Systems Used With Concrete By Slant Shear
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM C928/C928M	(2020a) Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs
ASTM C1202	(2022; E 2022) Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
ASTM C1583/C1583M	(2020) Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)
ASTM C1600/C1600M	(2023) Standard Specification for Rapid Hardening Hydraulic Cement
ASTM C1602/C1602M	(2022) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM D4580/D4580M	(2023) Standard Practice for Measuring Delaminations in Concrete Bridge Decks by Sounding
ASTM D412	(2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with the Statement of Work:

SD-01 Preconstruction Submittals

Qualifications; G, RO

Work Plan; G, RO

Quality Control Plan; G, RO

Concrete Repair Assessment Report; G, RO and DO

SD-03 Product Data

Polymers RO

Silicone Sealant RO

Reinforcing Steel

Miscellaneous Materials And Equipment

SD-04 Samples

Reinforcement And Reinforcement Supports

Polymers

SD-05 Design Data

Formwork And Shoring; G, RO

Repair Procedures; G, DO

Mixture Proportioning; G, DO

SD-06 Test Reports

Mixture Proportioning

Quality Control

Polymers

Aggregate

SD-07 Certificates

Qualifications

Reinforcement And Reinforcement Supports

Polymers

SD-08 Manufacturer's Instructions

Equipment For Concrete Preparation

Polymers

Silicone Sealant

Miscellaneous Materials And Equipment

1.5 QUALITY ASSURANCE

1.5.1 General Requirements

a. To protect personnel from overexposure to toxic materials, conform to the applicable manufacturer's Safety data sheets or local regulations. Submit manufacturer's Safety Data Sheets for all polymers as well as other potentially hazardous materials.

b. Submit the repair procedures for executing the work as well as the test data and documentation on materials used for repair. Submittal must include component materials, mixture proportions, and supplier's quality control program.

c. Inspection and testing of surface preparation as well as placement of reinforcing steel must be in accordance with provisions included herein and the Contract Document.

d. Sampling and testing of materials, as well as inspection and testing of work, must be in accordance with established procedures, manufacturer's instructions, specific instructions from the Technical Point of Contact if given, or recommended practices as referenced herein and the Contract Documents.

e. Trial batches and testing requirements for various repair materials specified are the responsibility of the Contractor.

f. The testing agency must inspect, sample, and test repair materials and concrete production as required. When it appears that material furnished or work performed by Contractor fails to conform to Contract Documents the testing agency will immediately report such deficiency.

1.5.2 Quality Control Plan

Submit a quality control plan as specified in the Statement of Work.

1.5.3 Qualifications

The submittals must where applicable, identify agencies and individuals who will be working on this contract and their relevant experience. Do not make changes in approved agencies or personnel without prior approval of the Technical Point of Contact .

1.5.3.1 Contractor Qualifications

The contractor performing the repair work must have been involved in a minimum of three concrete repair projects similar in size and scope to this project for at least five years. Submit information, including name, dollar value, date, and point-of-contact for similar projects which demonstrates the required experience and/or training.

1.5.3.2 Worker Qualifications

a. Each worker engaged in the use of specialized removal or application equipment, including saw operators must have satisfactorily completed an instruction program and three years of experience in the operation of the equipment. The worker must have active experience with the equipment within five years of the project.

b. Workers installing adhesive anchors must be ACI Adhesive Anchor Installer certified or equivalent.

c. Workers involved in surface preparation and the application of repair/patching product shall be experienced operators with a minimum of five years involvement in concrete repair project of similar size and scope. Operators shall be intimately familiar with the handling and application of proposed repair products. Otherwise, product manufacturer's technical representative shall be invited to conduct on-site training for the products. All repair operators shall be present for the training in addition to the supervisors, QA and District personnel.

1.5.3.3 Regulatory Requirements

Perform all work in accordance with applicable Federal, State, and local safety, health, and environmental requirements. The Contractor is responsible for obtaining all permits required by Federal, State, and local agencies for the performance of the work.

1.5.4 Pre-Construction Conference

Conduct a pre-construction conference to discuss repair materials performance requirements, control provisions, and roles and responsibilities for the Work to ensure that the Contractor's personnel understand all aspects of the repair material, its properties and application procedures. The conference must include the Contracting Officer or authorized representative, the Contractor's field superintendent and foreman, and a competent Technical Representative of the material manufacturer, and other involved trades or supplier representatives. The Technical Representative must be fully qualified to perform the work.

1.5.5 Work Plan

Prepare a work plan describing the methods of concrete removal and repair, including methods, equipment and materials to be used for each feature. Submit the work plan for approval at least 30 days prior to the start of the work. The plan must include, but not be limited to, repair materials to be used with specific information on products and/or constituents, and requirements for handling, storage, etc., equipment to be used, surface preparation, and requirements for placement, finishing, curing and protection specific to the materials used. Include a description of field demonstrations in the work plan. Do not commence work until the work plan and field demonstration representative of the type of work are approved. For each of the repair approaches chosen, a technical representative shall conduct hands on training attended by the repair technicians for proper preparation and use of the repair product. The Contractor shall arrange for the attendance of a qualified manufacturer technical representative to the project site, at the minimum, during each milestone for each of the repair approaches.

- Initial Pre-Construction Conference
- Hands on training for proper prepartion and use of the repair product.

1.6 ACCEPTANCE OF REHABILITATION WORK

1.6.1 General Requirements

a. Completed concrete rehabilitation work must conform to applicable requirements of Contract Document and this specification. The Contractor is responsible to bring Work into compliance with requirements of Contract Documents if the Concrete repair work fails to meet one or more requirements of Contract Documents.

b. Correct rejected repair work by removing and replacing or by strengthening with additional construction acceptable to the Technical Point of Contact . Use repair methods that meet applicable requirements for function, durability, dimensional tolerances, and appearance.

c. Submit proposed work plan, repair methods, materials, and modifications to the Work needed to correct rejected repair work to meet the requirements of Contract Documents.

1.6.2 Tolerances

a. Construction tolerances for repairs must conform to ACI 117. Where existing conditions do not allow tolerances to conform to ACI 117, use the details and materials for such conditions as indicated in the Contract Documents. For conditions not shown or that are different than indicated in the Contract Documents, notify the Contracting Officer before proceeding with the work at those locations. For conditions not shown or that are different than indicated in the Contract Documents, notify the Technical Point of Contact before proceeding with the work at those locations.

b. Inaccurately formed concrete surfaces resulting in concrete members with dimensions that exceed ACI 117 tolerances are subject to rejection.

1.6.3 Appearance

Concrete surfaces not meeting the requirements of the Contract Documents must be brought into compliance.

1.7 PROTECTION OF COMPLETED REHABILITATION WORK

a. Do not allow construction loads to exceed the loads that a structural member or structure is safely capable of supporting without damage. Provide supplemental support if construction loads are expected to exceed safe load capacity.

b. Protect repaired and adjacent areas from damage by construction traffic, equipment, and materials. During the curing period, protect repair materials from damage by mechanical disturbances, including load-induced stresses, shock, and vibration.

c. Protect repair materials from environmental damage by weather events during the length of the curing period.

PART 2 PRODUCTS

Products or materials used must conform to the requirements included

herein as well as the Contract Documents. The usage of other products or materials not covered by this requirement or specified in the Contract Documents are permitted upon approval by the Technical Point of Contact

Additional information and submittals for products and materials not included in this document including product data, samples, design data, test reports, certificates, manufacturer's instructions, and field reports must be submitted as requested by the Technical Point of Contact.

2.1 MATERIALS FOR SHORING AND BRACING

2.1.1 Shoring and Bracing Systems

Use commercially manufactured and engineered shoring and bracing systems and components, except where custom built assemblies of lumber or other suitable materials are permitted by the Technical Point of Contact .

2.1.2 Design Requirements

The design of the bracing and shoring must be based on ASCE/SEI 37.

a. Non-manufactured shoring and bracing systems must have calculations signed and sealed by a Licensed Design Professional.

b. Members of non-manufactured shoring systems, must be designed in accordance with the provisions of the governing building code for the specific material of the member.

c. Members of manufactured shoring systems, consisting of pre-engineered components designed and produced specifically for structural shoring, must be used in accordance with the manufacturer's recommendations.

2.2 EQUIPMENT FOR CONCRETE PREPARATION

Means and methods used for concrete removal and surface preparation must be selected and used such as to minimize damage to the structure and to the concrete substrate that remains.

2.2.1 Equipment for Concrete Removal

Removal equipment and techniques must be suitable to produce concrete surface profiles and level of cleanliness in designated areas as required by this specification and the contract Documents.

2.2.1.1 Cutting Equipment

a. The following cutting equipment are permitted: High-pressure water jet without abrasives, Saw cutting.

b. Cutting, lifting, and transporting equipment must be adequate to cut, support, and transport concrete sections without incurring any damage to the existing structure.

2.2.1.2 Concrete Breakers

a. Provide sharp tips on breaker equipment to minimize microcracking damage in partial depth removal.

b. The use of the following impact equipment and methods is permitted: Hand-held breakers, Boom-mounted breakers, Scabblers, Needle scalers,

Scarifiers, Milling methods, and hydrodemolition.

c. Impact breaker sizes shall be selected as appropriate for the locations of the work to be performed.

2.2.2 Surface preparation and cleaning equipment

2.2.2.1 Abrasive Blasting

a. Use dry or wet oil-free abrasive blasting capable of removing loose micro-fractured (bruised) or otherwise damaged or pulverized concrete surfaces, and rust from exposed steel reinforcement, and providing a surface profile in compliance with the Contract Documents.

2.2.2.2 Low Pressure Water Cleaning

Use equipment capable of delivering 1000 psi to to 5000 psi at 2 gal/min to 10 gal/min for cleaning loose material from repair areas.

2.2.2.3 Other Cleaning Equipment

Use equipment that delivers oil free air capable of cleaning loose material and debris from repair areas. If necessary to dry the concrete surface, clean, dry, compressed air may be used. Also, use vacuums capable of removing loose material and debris.

2.3 MATERIALS FOR FORMWORK AND EMBEDDED ITEMS

a. Formwork and embedded items must meet the requirements specified in ACI 347R.

b. Install and remove formwork without damaging or staining the existing structure or repair material.

c. Forms used for polymer concrete/mortars must be tight enough to hold the material that is used without leaking. All surfaces where bond is not desired, but which are exposed to the monomer or resin, must be treated with a form release agent.

2.4 REINFORCEMENT AND REINFORCEMENT SUPPORTS

2.4.1 Steel Bars, Wires, and Fiber-reinforced Concrete

a. Reinforcement and reinforcement support must meet the requirements specified in ACI 301 and ACI MNL-66.

b. Repair coating damage incurred during shipment, storage, handling, and placing of reinforcing bars in accordance with ASTM A780/A780M. Damaged areas must not exceed 2 percent of surface area in each linear foot of each bar.

c. Mechanical splices for coated reinforcement must have compatible coatings, in accordance with manufacturer's instructions. Splices for galvanized reinforcement must be galvanized or coated with dielectric material. Splices used with epoxy-coated or dual-coated reinforcement must be coated with dielectric material.

2.5 POLYMERS

a. The requirements for the properties of polymers and aggregates used in polymers must meet the requirements specified in this paragraph as well as the properties specified in the referenced specifications and the Contract Documents.

b. Polymers used must be compatible with other polymers and materials used on the project. Unless repair materials are specified in the contract documents, the Contractor is responsible for verifying material compatibilities.

c. Submit product data, manufacturer's Safety Data Sheets,samples, design data, test reports, certificates, manufacturer's instructions, and field reports for materials as required by this document as well as the referenced specifications and the Contract Documents.

2.5.1 Epoxies

a. Epoxy mortars and epoxy compounds must conform to ASTM C881/C881M.

b. Epoxy mortars used for repairing defects in hardened portland cement concrete must meet the requirements of ACI 503.2-503.4.

c. Epoxy used for crack repair must meet the requirements of ACI 548.15.

d. Epoxy used to produce a skid-resistant surface on hardened concrete must meet the requirements of ACI 548.16.

e. Epoxy used for overlays must meet the requirements of ACI 548.8.

f. Epoxy used for bonding freshly mixed concrete and hardened concrete must meet the requirements of ASTM C881/C881M, Type II, Grade 2, Class C.

g. Epoxy used for bonding hardened concrete and steel to hardened concrete must meet the requirements of ACI 548.12.

2.5.2 Silicone Sealant

a. Silicone Sealant to be a 100% silicone, ultraviolet (UV) resistant elastomeric joint sealant conforming to ASTM C920.

b. Product shall conform to the following requirements.

- Type S (Single-Component): Must be a pre-mixed, single-component compound that cures upon exposure to atmospheric moisture, requiring no jobsite mixing or additive agents.

- Grade NS (Non-Sag): Formulated with thixotropic properties to prevent slumping or sagging when applied to vertical, overhead, or inclined joint configurations.

- Class 25: Capable of accommodating dynamic expansion and contraction cyclic joint movement of up to 25 percent of the nominal joint width without cohesive or adhesive failure.

- NT (Non-Traffic): Rated and approved for installation in structural joints not subjected to pedestrian, heavy equipment, or vehicular traffic loads.

- M (Mortar): Tested and certified to ensure optimal adhesion and compatibility with masonry, mortar, and concrete substrates.

- O (Other Substrates): Tested and certified for adhesion and compatibility with non-porous and specialty architectural materials, including glass, aluminum, and designated metals.

2.5.3 Hydrophilic Waterstop Paste

- 100% Solids: Formulated without solvents or volatile organic compounds (VOCs) that could evaporate, ensuring zero shrinkage during the curing process to maintain a continuous, volumetric seal.

- Moisture Curing: Designed to initiate and complete the cross-linking curing process upon exposure to ambient atmospheric moisture or damp substrate conditions.

- Hydrophilic Properties: Engineered to actively swell and expand upon contact with water, creating a positive, dynamic compression seal within joints or penetrations to prevent water ingress and migration.

- Minimum 150% Elongation: Capable of stretching to a minimum of 150 percent of its original length prior to rupture, tested and verified in accordance with ASTM D412, ensuring high flexibility to accommodate structural shifting or dynamic joint movement.

- Minimum 150 psi Tensile Strength: Must withstand a minimum pulling force of 150 pounds per square inch before failure, tested and verified in accordance with ASTM D412, ensuring robust structural integrity and resistance to tearing under hydrostatic pressure.

2.5.4 Polymer Modified Concrete (PMC) Repair Material

a. Polymer Modified Concrete (PMC) to be a two component, polymer modified Portland cement based non-sag mortar suitable for vertical and overhead application.

b. Submit specific products uniquely suitable for different application such as total thickness of patching, hand trowel application or form and pour. Extend with aggregate as necessary and reccomended by prodcut manufacturer.

c. Product shall conform to the following requirements.

- Compressive Strength: 5000 psi (ASTM C109/C109M)

- Tensile Adhesion Strength: 2,000 psi (ASTM C882/C882M)

- Pull Out Resistance: > 250 psi Substrate Failure (ASTM C1583/C1583M)

- Shrinkage: 0.05% MAX (ASTM C157/C157M)

- Chloride Ion Diffusion Resistance: < 650 Coulombs (ASTM C1202)

- Set Time: > 20 minutes or as requried for the method of appliciation (ASTM C266)

- The patching material shall not be a vapor barrier.

Submit product data, samples, design data, test reports, certificates, manufacturer's instructions for acceptance by the Technical Point of Contact.

2.5.5 Aggregate

a. Addition of aggregate to pre-mixed pre-packaged patching compound shall be explicitly allowed by the manufacturer's technical publication to extend the thickness of the patch.

b. Unless otherwise specified or recommended by the polymer material manufacturer, aggregate used with polymers must meet ASTM C33/C33M requirements.

c. Aggregate properties and proportions used with polymers must meet the requirements of the polymer material manufacturer, the requirements of the referenced polymer standard, and the Contract Documents.

d. Aggregate used with polymers must be dry and free of dirt, asphalt, and other organic materials. Aggregate moisture content must be less than 0.2 percent by weight.

e. For patch repairs, the maximum-sized aggregate must not be greater than one third the depth of the patch area.

2.6 Corrosion Inhibitor/Bonding Agent

For use on any exposed reinforcing or embedded steel and hardened concrete surfaces. The corrosion inhibitor/bonding agent shall be an epoxy resin/portland cement adhesive which is fast setting and is capable of coating reinforcing steel and non-structural steel to prevent corrosion and for bonding plastic concrete repair mortar to hardened concrete. The material shall in no way decrease the bond strength between the reinforcing steel and the repair mortar, or between the repair surface and the repair mortar.

2.6.1 Properties of Corrosion Inhibitor/Bonding Agent

2.6.1.1 Flexural Strength

ASTM C348 28 day; 1000 psi (min).

2.6.1.2 Splitting Tensile Strength

ASTM C496/C496M 28 day; 1000 psi (min).

2.6.1.3 Bond Strength

Bond Strength @ 14 Days, ASTM C882/C882M.

(1) 2 hours open time: 3000 psi (min)
(2) 24 hours open time: 2000 psi (min)

2.6.1.4 Material Characteristics

(1) Pot life: 90 minutes @ 72 degrees F.
(2) Contact time: 24 hours
(3) Material shall not produce a vapor barrier.

2.7 MISCELLANEOUS MATERIALS AND EQUIPMENT

2.7.1 Packaged and proprietary materials

The required properties for the materials listed in this paragraph must meet the properties specified in the Contract Documents. Submit Product data, samples, design data, test reports, certificates, manufacturer's instructions, and field reports as required by the Technical Point of Contact and the Contract Documents.

a. Packaged, rapid hardening concrete repair materials must conform to ASTM C928/C928M.

b. Packaged, mortar and concrete must conform ASTM C387/C387M.

c. Rapid hardening cement must conform to ASTM C1600/C1600M.

Water used with packaged and proprietary materials must meet ASTM C1602/C1602M requirements. Aggregates must meet the repair material manufacturer's requirements if available and ASTM C33/C33M if such requirements are not specified.

2.7.2 Miscellaneoius Equipment

a. Equipment designed specifically for the application of repair materials must be used as required by the repair material manufacturer and the referenced specification.

b. Equipment not listed in this specification but referenced or used for repairs must be clean and in good operating condition.

c. All supplies and equipment must be available in sufficient quantities to allow continuity in the installation project and quality assurance.

2.8 MIXTURE PROPORTIONING

a. Polymer concrete/mortar/resin/monomer proportioning, handling, and mixing procedures as well as equipment used for mixing these materials must conform to the requirements of the referenced material specifications and the repair material manufacturer's directions.

b. Proportioning and mixing materials not specified above must follow the requirements provided by the repair material manufacturer.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

3.1.1 Examination

Locate area of unsound concrete or delamination using hammer sounding or chain drag sound methods in accordance to ASTM D4580/D4580M. Denote and mark perimeter boundaries and notify the Technical Point of Contact to approve the unsound concrete layout boundaries.

3.1.2 Protection

Protect pedestrians, motorized traffic, mechanical, electrical, and plumbing equipment, surrounding construction, project site, landscaping, and surrounding buildings from damage or injury resulting from concrete rehabilitation work.

a. Construct dust and debris barriers surrounding repair work perimeter to control dust and to protect and control construction traffic.

b. Dispose of runoff from wet demolition or surface preparation operations in accordance with all local ordinances. Disposal methods must avoid soil erosion, avoid undermining pavements and foundations, damage to landscaping and vegetation, and minimize water penetration through other parts of buildings.

c. Collect and neutralize alkaline wastes and acid wastes and dispose in accordance with local, state, and federal regulations.

d. Comply with local noise ordinances during demolition operations.

e. Perform demolition work and surface preparation work in a manner that minimizes disturbances of operations. Coordinate work with the Technical Point of Contact .

f. Submit a proposed protection plan for approval by owner representative and Licensed Design Professional.

3.1.3 Formwork and Shoring

3.1.3.1 Formwork

a. Construct forms to sizes, shapes, lines, and dimensions to match existing adjacent surfaces and textures. Provide forms that match openings, offsets, chamfers, anchorages, inserts and other features as described on Contract Documents. Construct forms to accommodate installation of products by other trades. Provide forms for easy removal to minimize damage to concrete surfaces and adjacent surfaces. Apply form release coating over formwork surfaces prior to each concrete placement. Form release agents must not be applied to or come in contact with the repair area concrete substrate or reinforcement.

b. Do not damage repair material during removal of formwork for columns, walls, sides of beams, and other parts not supporting weight of concrete or repair material. Perform needed repair and treatment required on vertical surfaces at once and follow immediately with specified curing. Remove all formwork anchors embedded in existing concrete. Fill anchor holes and repair all damage to existing concrete

at anchor holes.

3.1.3.2 Shoring

a. Provide shoring in accordance with the shoring drawings prior to performing work to brace the substrate structure temporarily while repair work is proceeding. Shoring must be designed, documented, and stamped by a Licensed Design Professional. Shoring designs must be submitted to and approved by the Technical Point of Contact prior to work commencing.

b. Leave formwork and shoring in place to support existing loads, construction loads and weight of repair material in beams, slabs, and other structural members until in-place strength of repair material determined in accordance with the Contract Documents. When shores and other supports are arranged to allow removal of form-facing material without allowing structural slab or member to deflect, form-facing material and its horizontal supporting members may be removed at an earlier age.

3.1.4 Concrete preparation

a. Remove concrete as needed per the removal requirements of this section. Limits on removal equipment are specified in the paragraph titled EQUIPMENT FOR CONCRETE PREPARATION.

b. Remove foreign material, such as dirt, oil, grease, or other chemicals, from the cracks before injection using compressed air, low-pressure water, or vacuuming. Allow wet surfaces to dry at least 24 hours.

c. Immediately before placing the repair material or installing formwork, make the repair area available for inspection by the Technical Point of Contact . Obtain acceptance by the Technical Point of Contact of surface preparation before proceeding with Work. If the Work is rejected, perform additional operations to the satisfaction of Contracting Officer.

d. Repairs must be placed in lifts per manufacturer's written reccomendations.

e. Perform tensile pull-off tests in accordance with ASTM C1583/C1583M. Pull-off strength must meet or exceed 250 psi. Test a minimum of 3 specimens at locations no greater than 500 square yards of prepared surface.

f. The prepared surface must have a concrete surface profile equivalent to CSP as defined by the manufacturer's instructions.

3.1.5 Quality Control

3.1.5.1 Quality control of surface preparation

Evaluation of prepared substrate must be continuously monitored to assure that the prepared substrate surface meets project requirements.

3.1.5.2 Quality control of repair overlays

All components of overlay PPCC materials must be certified by the material

manufacturer or aggregate supplier to meet all project testing requirements. During the PPCC overlay, take mixed samples and check that the materials are mixed properly. Confirm that the right PC overlay thickness was applied by recording the volume of PC overlay materials and the substrate surface area covered by the overlay.

3.1.6 Curing

a. For polymer concrete/mortar Work, follow manufacturer's requirements for curing.

3.1.7 Clean up

a. Clean and remove all spills and leaks of injection adhesive and stains caused by the injection adhesives.

b. Dispose wastewater used for cutting and cleaning without staining or damaging the existing surfaces of the structure or the environment of the project area. The method of disposal must meet all the requirements of the Statement of Work.

3.1.8 Safety

a. Provide Material Safety Data Sheets (MSDS) for products on site reviewing them before work begins.

b. Provide safety guards, maintenance, and warnings for all machinery and equipment.

c. Have personal protection equipment practice in place - eye protection and face guards.

d. Have all workers in contact with wet cementitious material wear protective gloves and clothing.

e. Provide eyewash facilities on-site with location signage.

f. Provide dust masks for workers operating mixers.

g. Have confined space procedures in place including adequate ventilation in closed spaces before operating equipment or using products that emit potentially dangerous or toxic exhaust, fumes, or dust.

h. Provide secured storage available for all hazardous or flammable materials.

i. Conduct safety meetings prior to beginning repair operations.

3.2 CORROSION AND SURFACE REPAIR

3.2.1 Preparation

3.2.1.1 Identification of Extent of Concrete Removal

a. Configure geometry of removal area to maximize the use of right-angle geometry, avoiding reentrant corners, and to obtain uniformity of depth. Determine the depth, location, and size of reinforcing bars prior to removal of concrete.

b. Perform visual inspection and hammer tapping, chain drag sounding, or other methods acceptable by the Technical Point of Contact to identify cracked, delaminated, spalled, disintegrated, and otherwise unsound
concrete for removal. Mark boundaries of repair area before concrete removal.

c. Inspect the marked boundaries with the Technical Point of Contact prior to commencing with the concrete removal. Contractor shall submit a Concrete Repair Assessment Report detailing repair area locations, depths, and quantities for approval before beginning any repairs. Government will be given two weeks to review the proposed work and
will have the right to reject or request changes to the work being proposed.Revise the repair area boundaries as instructed by the Contracting Officer.

3.2.1.2 Shoring and Formwork

a. Provide shoring and formwork per the paragraph titled Formwork and Shoring.

b. For post-tensioned concrete, detension strands and wires as required by Contract Documents prior to repair.

3.2.1.3 Concrete Removal

a. Remove concrete from repair areas to indicated depth and profile. Notify Technical Point of Contact if additional delaminated, fractured, or unsound concrete is present.

b. Do not damage embedded reinforcing and adjacent concrete. The removal methods must produce minimal microcracking (bruising) of the prepared substrate surfaces. Avoid directly striking reinforcing steel with impact tools used for concrete removal.

c. Saw concrete along straight lines to a depth of a minimum 1 inch. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete. Do not cut or damage embedded reinforcement or other embedded items. If embedded reinforcing steel or other embedded items are too close to the surface to provide the perpendicular edge cut, notify the Technical Point of Contact for direction before proceeding.

d. Extend concrete removal along the corroded reinforcing steel to a point where there is no further delamination, concrete cracking, or reinforcing steel corrosion, and where the reinforcement is bonded to the surrounding concrete.

e. Remove concrete around the exposed layer of reinforcement to a uniform depth beyond within the repair areas to provide a minimum clearance between exposed reinforcing steel and surrounding concrete of 0.75 in. , or at least 0.25 in. larger than the maximum nominal size of the coarse aggregate in the repair material, whichever is greater.

3.2.1.4 Preparation of Concrete Substrate Surface

a. Confirm perpendicular edges at repair area perimeter, and reinstate if

damaged by concrete removal process. Remove loosely bonded concrete, bruised or fractured concrete, and bond-inhibiting materials such as dirt, concrete slurry, or any other detrimental materials from the concrete substrate using approved methods. Where concrete has been removed by impact methods, abrasive blasting must be used to prepare the surface and remove bruised concrete.

b. Provide substrate surface profiles as specified in the Contract Documents.

c. Visually inspect and sound substrate surface to confirm that no further delaminations or otherwise unsound concrete remains. If encountered, notify the Technical Point of Contact .

d. Clean the substrate per the paragraph titled Concrete preparation.

3.2.2 Application

3.2.2.1 Existing Reinforcement Preparation

a. Clean existing reinforcement that will remain. Remove corrosion and/or other laitance and notify the Technical Point of Contact if section loss is greater than 20%.

3.2.2.2 Placement of New Reinforcement

Placement of new reinforcement

a. Placement of new reinforcement to replace or strengthen existing reinforcement is like new construction. Placement, splicing, and handling of new reinforcement must meet the requirements specified in ACI 301 and ACI SP-66.

b. Reinforcement must be free of materials deleterious to bond. New reinforcement with rust, mill scale, or a combination of both will be considered satisfactory, provided minimum nominal dimensions, nominal weight, and minimum average height of deformations of a hand-wire-brushed test specimen are not less than applicable ASTM specification requirements.

3.2.2.3 Placement of Concrete

a. A bonding agent must be used.

b. Repairs must be placed in lifts in accordnace with manufacturer's written reccomendatiosn.

c. Consolidate the repair material after placement with a vibrating screed or internal vibrator.

d. Finish the surface to match surface finish and texture requirements indicated in the Contract Document and per manufacturer's written reccomendations.

3.2.2.4 Placement of Other Repair Materials

a. Equilibrate repair material(s) and substrate to the temperature, cleanliness of substrate and reinforcement, and moisture requirements of the repair material manufacturer's requirements.

b. Comply with the repair material manufacturer's requirements for batching, mixing, placing and curing repair materials.

c. Review consistency of the mixed repair material(s) relative to the parameters documented in the repair material manufacturer product data sheet. If non-conforming, adjust consistency in compliance with the repair material manufacturer's requirements.

d. Apply or install repair material(s) within the application time frame (pot life) requirements of the repair material manufacturer's requirements, and place and consolidate to provide well-compacted repair.

e. Finish and tool repair materials, finished in accordance with the repair material manufacturer's written instructions and as indicated in Contract Documents.

f. Protect installed repair material(s) from damage, exposure to environmental conditions that are detrimental to the uncured or cured properties of the material. Cure in accordance with the requirements of the repair material manufacturer's requirements.

3.2.3 Quality Control

a. Protect concrete surfaces, beyond limits of surfaces receiving bonding agent adhesive, against spillage. Immediately remove any bonding agent adhesive that has spilled beyond desired area. Perform cleanup with material designated by bonding agent adhesive manufacturer. Avoid contamination of work area.

b. The bond strength between the existing concrete and the repair material must be a minimum of 250 psi per ASTM C1583/C1583M.

-- End of Section --

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DIVISION 07 - THERMAL AND MOISTURE PROTECTION

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08/23

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SECTION 07 19 00

PENETRATING SEALER
08/23

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 259	(2002; R 2021) Standard Method of Test for Resistance of Concrete to Chloride Ion Penetration
AASHTO T 260	(2021) Standard Method of Test for Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials

ASTM INTERNATIONAL (ASTM)

ASTM C140/C140M	(2023) Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
ASTM D2369	(2024) Standard Test Method for Volatile Content of Coatings
ASTM D3278	(2021) Standard Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus
ASTM E96/E96M	(2024) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
ASTM E514/E514M	(2020) Standard Test Method for Water Penetration and Leakage Through Masonry
ASTM G154	(2023) Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000	Air Contaminants

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification

identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Penetrating Sealers; G, DO

SD-06 Test Reports

Water Absorption

Accelerated Weathering

Resistance to Chloride Ion Penetration

Moisture Vapor Transmission

Water Penetration and Leakage

SD-07 Certificates

Manufacturer's Qualifications

Applicator's Qualifications

Evidence of Acceptable Variation

Warranty

SD-08 Manufacturer's Instructions

Application Instructions

Manufacturer's Safety Data Sheets

1.3 QUALITY ASSURANCE

1.3.1 Qualifications

a. Manufacturer's qualifications: Minimum five years record of successful in-service experience of water repellent treatments manufactured for concrete, application.

b. Applicator's qualifications: Minimum five years successful experience in projects of similar scope using specified or similar treatment materials and manufacturer's approval for application.

1.3.2 Performance Requirements

a. Water absorption: ASTM C140/C140M. Comparison of treated and untreated specimens.

b. Moisture vapor transmission: ASTM E96/E96M. Comparison of treated and untreated specimens.

c. Water penetration and leakage through masonry: ASTM E514/E514M.

d. Resistance to chloride ion penetration: AASHTO T 259 and AASHTO T 260.

e. Resistance to Accelerated weathering: ASTM G154

1.3.3 Evidence of Acceptable Variation

If a product proposed for use does not conform to requirements of the referenced specification, submit for approval to the Technical Point of Contact , evidence that the proposed product is either equal to or better than the
product specified. Include the following:

a. Identification of the proposed substitution;

b. Reason why the substitution is necessary;

c. A comparative analysis of the specified product and the proposed substitution, including tabulations of the composition of pigment and vehicle;

d. The difference between the specified product and the proposed substitution; and

e. Other information necessary for an accurate comparison of the proposed substitution and the specified product.

1.4 PRE-INSTALLATION MEETING

a. Attend pre-installation meeting required prior to commencement of concrete installation.

b. Review procedures and coordination required between water repellent treatment work and work of other trades which could affect work to be performed under this section of the work. Discuss surface preparation, compatibility of water repellent with the proposed patching work, masking of non-concrete components within work area, application and clean up.

1.5 REGULATORY REQUIREMENTS

1.5.1 Environmental Protection

Provide coating materials that conform to the restrictions of the Local Air Pollution Control jurisdiction. Notify the Technical Point of Contact of water repellent coating specified herein which fails to conform to the
local Air Quality Management District Rules at the location of the Project. In localities where the specified coating is prohibited, the Contracting Officer may direct the substitution of an acceptable coating.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver materials in original sealed containers, clearly marked with the manufacturer's name, brand name, type of material, batch number, percent solids by weight and volume, and date of manufacturer. Store materials off the ground, in a dry area where the temperature will be not less than 50 degrees F nor more than 85 degrees F.

1.7 SAFETY METHODS

Apply coating materials using safety methods and equipment in accordance with the U.S. Army Corps of Engineers Safety and Health Requirements

Manual (EM-385-1-1, most recent edition) and all applicable Occupational Safety and Health Adminstration (OSHA), federal, state, local safety and health requirements and the following:

1.7.1 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

a. The coating manufacturer when using solvents or other chemicals. Use impermeable gloves, chemical goggles or face shield, and other recommended protective clothing and equipment to avoid exposure of skin, eyes, and respiratory system. Conduct work in a manner to minimize exposure of building occupants and the general public.

b. 29 CFR 1910.1000.

c. Threshold Limit Values (R) of the American Conference of Governmental Industrial Hygienists.

d. Manufacturer's Safety Data Sheets.

1.8 ENVIRONMENTAL CONDITIONS

1.8.1 Weather and Substrate Conditions

Do not proceed with application of penetrating sealer under any of the following conditions, except with written recommendations of manufacturer.

a. Ambient temperature is less than 40 degrees F.

b. Substrate faces have cured less than one month.

c. Rain or temperature below 40 degrees F are predicted for a period of 24 hours before or after treatment.

d. Earlier than three days after surfaces are wet.

e. Substrate is frozen or surface temperature is less than 40 degrees F and falling.

1.8.2 Moisture Condition

Determine moisture content of substrate meets manufacturer's requirements prior to application of water repellent material.

1.9 SEQUENCING AND SCHEDULING

1.9.1 Concrete Surfaces

Do not start water repellent coating until all patching, pointing and cleaning operations have been completed and concrete has cured a minimum of 30 days under normal weather conditions.

1.9.2 Sealants

Do not apply penetrating sealer until the sealants for joints adjacent to surfaces receiving water repellent treatment have been installed and cured.

a. Water repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.

b. Provide manufacturers' test results of compatibility.

1.10 INSPECTIONS

Notify the manufacturer's representative a minimum of 72 hours prior to scheduled application of penetrating sealer for field inspection. Inspect surfaces and obtain approval in writing from the manufacturer's representative prior to application of water repellent coating.

1.11 SURFACES TO BE COATED

Coat all exterior concrete along all concrete surfaces of exterior stairs.

1.12 WARRANTY

Provide a warranty, issued jointly by the manufacturer and the applicator of the water repellent treatment against moisture penetration through the treated structurally sound surface for a period of five years. Warranty to provide the material, labor, and equipment necessary to remedy the problem. At the satisfactory completion of the work, complete the warranty sign, notarize, and submit to the Technical Point of Contact .

PART 2 PRODUCTS

2.1 MATERIALS

Provide a clear, non-yellowing, deep-penetrating, VOC compliant water repellent solution. Material must not stain or discolor and must produce a mechanical and chemical interlocking bond with the substrate to the depth of the penetration.

2.2 PENETRATING SEALER

2.2.1 Siloxanes

Penetrating Sealers. Alkylalkoxysiloxanes that are oligomerous with alcohol, ethanol, mineral spirits, or water.

a. Solids by weight: ASTM D2369, 7.5 to 16.0 percent.

b. Volatile Organic Content (VOC) after blending: Less than 175 grams per liter.

c. Density, activated: 8.4 pounds per gallon, plus or minus one percent.

d. Flash point, ASTM D3278: Greater than 212 degrees F.

2.2.2 VOC-Complying Penetrating Sealers

Products certified by the manufacturer that they comply with local regulations controlling use of volatile organic compounds (VOC's).

2.3 PERFORMANCE CRITERIA

2.3.1 Siloxanes

a. Dry time for recoat, if necessary: One to two hours depending on weather conditions.

b. Penetration: 3/8 inch, depending on substrate.

c. Water penetration and leakage through masonry, ASTM E514/E514M, percentage reduction of leakage: 97.0 percent minimum.

d. Moisture vapor transmission, ASTM E96/E96M: 47.5 perms or 82 percent maximum compared to untreated sample.

e. Resistance to accelerated weathering, ASTM G154. Testing 2,500 hours: No loss in repellency.

f. Resistance to chloride ion penetration, AASHTO T 259 and AASHTO T 260.

PART 3 EXECUTION

3.1 EXAMINATION

Examine concrete surfaces to be treated to ensure that:

a. All visible cracks, voids or holes have been repaired.

b. All mortar joints in masonry are tight and sound, have not been re-set or misaligned and show no cracks or spalling.

c. Moisture contents of walls does not exceed 15 percent when measured on an electronic moisture register, calibrated for the appropriate substrate.

d. Concrete surfaces are free of form release agents, curing compounds and other compounds that would prevent full penetration of the water repellent material.

Do not start water repellent treatment work until all deficiencies have been corrected, examined, and found acceptable to the Technical Point of Contact and the water repellent treatment manufacturer. Do not apply treatment to damp, dirty, dusty, or otherwise unsuitable surfaces. Comply with the manufacturer's recommendations for suitability of surface.

3.2 PREPARATION

3.2.1 Surface Preparation

Prepare substrates in accordance with water repellent treatment manufacturer's recommendation. Clean surfaces of dust, dirt, efflorescence, alkaline, and foreign matter detrimental to proper application of water repellent treatment. Refer to paragraph 3.4.1 WATER REPELLENT TREATMENT.

3.2.2 Protection

Provide masking or protective covering for materials which could be damaged by water repellent treatment.

a. Protect glass, glazed products, and prefinished products from contact with water repellent treatment.

b. Protect landscape materials with breathing-type drop cloths; plastic covers are not acceptable.

3.2.3 Compatibility

a. Confirm treatment compatibility with each type of joint sealer within or adjacent to surfaces receiving water repellent treatment in accordance with manufacturer's recommendations.

b. When recommended by joint sealer manufacturer, apply treatment after application and cure of joint sealers. Coordinate treatment with joint sealers.

c. Mask surfaces indicated to receive joint sealers which would be adversely affected by water repellent treatment where treatment must be applied prior to application of joint sealers.

3.3 MIXING

Mix water repellent material thoroughly in accordance with the manufacturer's recommendations. Mix, in quantities required for that day's work, all containers prior to application. Mix each container the same length of time.

3.4 APPLICATION

In strict accordance with the manufacturers written requirements. Do not start application without the manufacturer's representative being present or their written acceptance of the surface to be treated. Submit manufacturer's instructions including preparation, application, recommended equipment to be used, safety measures, and protection of completed application.

3.4.1 Water Repellent Treatment

All surfaces to be sealed must be dry, clean, and sound before application. Remove all grease, curing compounds, surface treatments, coatings, oils, etc. Preparation Work: Concrete surfaces must be prepared using mechanical mean with high pressure water. High pressure wash, at 1500-3000 psi, all surfaces that require penetrating sealer to clean and open up the pores of the concrete must be done.

3.4.1.1 Spray Application

Spray apply water repellent material to exterior concrete, surfaces using low-pressure airless spray equipment in strict accordance with manufacturer's printed application, instructions, and precautions. Maintain copies at the job site. Apply flood coat in an overlapping pattern allowing approximately 8 to 10 inch rundown on the vertical surface. Maintain a wet edge at all overlaps, both vertical and horizontal. Hold gun maximum 18 inches from wall.

3.4.1.2 Brush or Roller Application

Brush or roller apply water repellent material only at locations where

overspray would affect adjacent materials and where not practical for spray applications.

3.4.1.3 Covered Surfaces

Coat all exterior concrete, surfaces including back faces of parapets, tops of walls, edges and returns adjacent to window and door frames, window sills, and free-standing walls.

3.4.1.4 Rate of Application

Apply materials to exterior surfaces at the coverages recommended by the manufacturer and as determined from sample panel test. Increase or decrease application rates depending upon the surface texture and porosity of the substrate to achieve even appearance and total water repellency.

3.4.1.5 Number of Coats

The results of the sample panel test determines the number of coats required to achieve full coverage and protection A minimum of two coats shall be applied. Subsequent coats shall be applied perpendicular to the preceding coat..

3.4.1.6 Appearance

If unevenness in appearance, lines of work termination or scaffold lines exist, or detectable changes from the approved sample panel occur, the Contracting may require additional treatment at no additional cost to the Government. Apply required additional treatment to a natural break off point.

3.5 CLEANING

Clean all runs, drips, and overspray from adjacent surfaces while the water repellent treatment is still wet in a manner recommended by the manufacturer.

-- End of Section --