

APPENDIX II

Specifications
for the Construction of

Fish Access to the Fish Passage Facility
Hunts Mill Dam, Ten Mile River. East Providence, Rhode Island

State of Rhode Island
Department of Environmental Management
Division of Planning and Development
235 Promenade Street
Providence, Rhode Island

Date of Issue: July 2022

SECTION 00002
PROJECT DIRECTORY

OWNER:

State of Rhode Island and Providence Plantations
Department of Administration
One Capitol Hill
Providence, Rhode Island 02908

USER AGENCIES:

State of Rhode Island and Providence Plantations
Department of Environmental Management
Division of Fish and Wildlife
277 Great Neck Road
West Kingston, Rhode Island 02891

State of Rhode Island and Providence Plantations
Department of Environmental Management
Division of Parks and Recreation
1100 Tower Hill Road
North Kingstown, Rhode Island 02852

ENGINEER:

State of Rhode Island and Providence Plantations
Department of Environmental Management
Division of Planning and Development
235 Promenade Street
Providence, Rhode Island 02908

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Please refer to the RI Dept. of Administrations Centralized Templates and Forms website for the most updated versions of the applicable contracts:

AIA A101 Standard Form of Agreement Between Owner and Contractor

AIA A201 General Conditions of the Contract for Construction

SECTION 01010
SUMMARY OF THE WORK

PART 1 - GENERAL:

1.1 DESCRIPTION:

Work included: The "Project," of which the "Work" of this Contract is a part, is titled "Fish Access to the Fish Passage Facility, Hunts Mill Dam, Ten Mile River, East Providence, Rhode Island".

The work of this Contract is defined in the Contract Documents to include, but not necessarily to be limited to furnishing all labor, materials and equipment necessary to perform the following: Development of four (4) step-pools downstream of the existing Hunts Mill Fish Ladder to promote fish access to the ladder. The weir pool system will be placed along the western side of the channel, between the bank and an existing rock ledge. The work will consist of five weir walls constructed from wire mesh gabion baskets placed on leveling fill and finished with a capstone to mimic the natural rock in the channel. Additional rock will be placed along the existing rock ledge to further confine each pool to the designed elevations.

The Contractor shall note that the USFWS fisheries expert is required onsite during construction to make real-time decisions regarding site configuration based on conditions on the ground at the time of construction.

1.2 DAMAGE TO EXISTING STRUCTURES AND FEATURES

The Contractor shall prevent the existing river bank, nearby Hunt's Mill building, fish ladder, and other existing structures and features from becoming damaged during the prosecution of the work. All damages to existing structures and features caused by the Contractor's operations shall be repaired at the Contractor's expense.

*******END OF SECTION*******

SECTION 01015
CONTRACTOR'S USE OF THE PREMISES

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: this section applies to situations in which the contractor or their representatives including, but not limited to, suppliers, subcontractors, employees, and field engineers, enter upon the Owner's property.

1.2 QUALITY ASSURANCE:

- A. Promptly upon award of the contract, notify all pertinent personnel regarding requirements of this section.
- B. Require that all personnel who will enter upon the Owner's property certify their awareness of and familiarity with the requirements of this section.

1.3 SUBMITTALS:

- A. Maintain an accurate record of the names and identification of all persons entering upon the Owner's property in connection with the Work of this Contract, including times of entering and times of leaving, and submit a copy of the record to the Owner every two (2) weeks.

1.4 STORAGE AND PARKING:

- A. Truck, equipment and contractor's vehicle access:
 - 1. Provide adequate protection for curbs and sidewalks and parking areas over which trucks and equipment pass to reach the job site.
 - 2. Do not permit contractor's vehicles to park in any area of the Owner's property except where the Owner has designated as the "Contractor's Parking Area".
 - 3. Areas to be used by the Contractor for storage of equipment and materials will be designated by the Owner.

*****END OF SECTION*****

SECTION 01045
CUTTING AND PATCHING

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: This section establishes general requirements pertaining to cutting (including excavating), fitting, and patching of the Work required to:
 - 1. Make the several parts fit properly;
 - 2. Uncover work to provide for installing, inspecting, or both, of ill-timed work;
 - 3. Remove and replace work not conforming to requirements of the Contract Documents;
 - 4. Remove and replace defective work;
 - 5. Fitting of new work to existing work to remain;

- B. Related work:
 - 1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. In addition to other requirements specified, upon the Engineer's request uncover work to provide for inspection by the Engineer of covered work and remove samples of installed materials for testing.
 - 3. Do not cut or alter work performed under separate contracts without the Engineer's written permission.

1.2 QUALITY ASSURANCE:

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1.3 SUBMITTALS:

- A. Request for Engineer's consent:
 - 1. Prior to cutting which effects structural safety, submit written request to the Engineer for permission to proceed with cutting.
 - 2. Should conditions of the Work, or schedule, indicate a required change of materials or methods for cutting and patching, notify the Engineer and secure his/her written permission and the required Change Order approval prior to proceeding.

- B. Notices to the Engineer:
 - 1. Submit written notice to the Engineer designating the time the Work will be uncovered, to provide for the Engineer's observation.

PART 2 - PRODUCTS:

2.1 MATERIALS:

- A. For replacement of items removed, use materials complying with pertinent sections of these specifications.
- B. For replacement of concrete, duplicate existing structure in accordance with RIDOT Standard Specifications for Road and Bridge Construction.

2.2 PAYMENT FOR COSTS:

- A. The Owner will reimburse the Contractor for cutting and patching performed pursuant to the written Change Order, after claim for such reimbursement is submitted by the Contractor. Perform other cutting and patching needed to comply with the Contract Documents at no additional cost to the Owner.

PART 3 - EXECUTION:

3.1 SURFACE CONDITIONS:

- A. Inspection:
 - 1. Inspect existing condition, including elements subject to movement or damage during cutting, excavating, patching, and backfilling.
 - 2. After uncovering the work, inspect conditions affecting installation of new work.
- B. Discrepancies:
 - 1. If uncovered conditions are not as anticipated, immediately notify the Engineer and secure needed directions.
 - 2. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION PRIOR TO CUTTING:

- A. Provide required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.

3.3 PERFORMANCE:

- A. Perform required excavating and backfilling as required under pertinent other sections of these Specifications.
 - 1. Perform cutting and demolition by methods which will prevent damage to other portions of the Work and provide proper surfaces to receive installation of repair and new work.
 - 2. Perform fitting and adjusting of products to provide finished installation complying with the specified tolerances and finishes.

*******END OF SECTION*******

SECTION 01050
FIELD ENGINEERING

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: Provide such field engineering services as required for proper completion of the Work including, but not necessarily limited to:
 - 1. Establishing and maintaining lines and levels;
 - 2. Structural design of shores, forms, and similar items provided by the Contractor as part of their means and methods of construction.

- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Additional requirements for field engineering also may be described in other Sections of these specifications.

1.2 QUALITY ASSURANCE:

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS:

- A. Comply with pertinent provisions of Section 01340.

- B. Upon request of the Engineer, submit:
 - 1. Data demonstrating qualifications of persons proposed to be engaged for field engineering services.
 - 2. Documentation verifying accuracy of field engineering work.

1.4 PROCEDURES:

- A. In addition to procedures directed by the Contractor for proper performance of the Contractor's responsibilities:
 - 1. RIDEM will be available to provide the contractor with the necessary layout points and vertical benchmarks upon request by the contractor.
 - 2. Locate and protect control points before starting work on the site.
 - 2. Preserve permanent reference points during progress of the work.
 - 3. Do not change or relocate reference points or items of the Work without specific approval from the Engineer.
 - 4. Promptly advise the Engineer when a reference point is lost or destroyed, or requires relocation because of other changes in the Work.

*****END OF SECTION*****

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: To enable orderly review during progress of the Work, and to provide for systematic discussion of problems, the Architect/Engineer will conduct project meetings throughout the construction period.
- B. Related Work:
 - 1. Documents affecting work of this section include, but not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. The Contractor's relations with his subcontractors and materials suppliers, and discussions relative thereto, are the Contractor's responsibility and normally are not part of project meetings content.

1.2 QUALITY ASSURANCE:

- A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.

1.3 SUBMITTALS:

- A. Agenda items: To the maximum extent practicable, advise the Architect/Engineer at least twenty-four (24) hours in advance of project meetings regarding items to be added to the agenda.
- B. Minutes:
 - 1. The Contractor will compile minutes of each project meeting and will furnish electronic copies to the Architect/Engineer and to the Owner.
 - 2. Recipients of copies may distribute as they wish.

PART 2 - PRODUCTS:

(No products are required in this Section)

PART 3 - EXECUTION:

3.1 PROJECT MEETINGS:

- A. Attendance:
 - 1. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work.
 - 2. The Owner's Representative and the Architect/Engineer's Representative shall also be in attendance at these meetings.

3. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the Work is involved.

B. Minimum agenda:

1. Review, revise as necessary, and approve minutes of previous meetings.
2. Review progress of the Work since last meeting, including status of submittals for approval. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule.
3. Identify problems which impede planned progress.
4. Develop corrective measures and procedures to regain planned schedule.
5. Complete other current business.

C. Revisions to minutes:

1. Unless published minutes are challenged in writing prior to the next regularly scheduled project meeting, they will be accepted as properly stating the activities and decisions of the meeting.
2. Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.
3. Challenge to minutes shall be settled as priority portion of "old business" at the next regularly scheduled meeting.

*******END OF SECTION*******

SECTION 01201
PRECONSTRUCTION CONFERENCE

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: To help clarify construction contract administration procedures, the Architect/Engineer will conduct a Preconstruction Conference prior to start of the Work. Provide attendance by the designated personnel

- B. Related work:
 - 1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE:

- A. For those persons designated by the Contractor, his subcontractors, and suppliers to; attend the Preconstruction Conference, provide required authority to commit the entities they represent of solutions agreed upon in the Conference.

1.3 SUBMITTALS:

- A. To the maximum extent practicable, advise the Engineer at least 24 hours in advance of the conference as to items to be added to the agenda.

- B. The Engineer will compile minutes of the Conference and will furnish electronic copies of the minutes to the Contractor and required copies to the Owner. The Contractor may distribute copies as he/she wishes.

1.4 PRECONSTRUCTION CONFERENCE:

- A. The Conference will be scheduled to be held within 15 working days after the Owner has issued the Notice to Proceed, but prior to actual start of the Work.

- B. Attendance:
 - 1. Provide attendance by authorized representatives of the Contractor and major subcontractors.
 - 2. The Engineer will advise other interested parties, including the Owner, and request their attendance.

- C. Minimum agenda: Data will be distributed and discussed on:
 - 1. Organizational arrangement of the Contractor's forces and personnel, and those of subcontractors, materials suppliers, and the Engineer;
 - 2. Channels and procedures for communication;
 - 3. Construction schedule, including sequence of critical work;
 - 4. Contract Documents, including distribution of required copies of Drawings and revisions;
 - 5. Processing of Shop Drawings and other data submitted to the Engineer for review;
 - 6. Processing of field decisions and Change Orders;
 - 7. Rules and regulations governing performance of the Work; and
 - 8. Procedures for safety and first aid, security, quality control, housekeeping, and related matters.

*****END OF SECTION*****

SECTION 01310
CONSTRUCTION SCHEDULES

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: To assure adequate planning and execution of the Work so that the Work is completed within the number of calendar days allowed in the Contract, and to assist the Architect/Engineer in appraising the reasonableness of the proposed schedule and in evaluating progress of the Work, prepare and maintain the schedule and reports described in this Section.

- B. Related work:
 - 1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Requirements for progress schedule: General Conditions.
 - 3. Construction period: Form of Agreement.

- C. Definitions:
 - 1. "Day," as used throughout the Contract unless otherwise stated, means "calendar day."

1.2 QUALITY ASSURANCE:

- A. Employ a scheduler who is thoroughly trained and experienced in compiling construction data, and in preparing and issuing reports as required below.

- B. Perform data preparation, analysis, charting, and updating in accordance with standards approved by the Architect/Engineer.

- C. Reliance upon the approved schedule:
 - 1. The construction schedule as approved by the Architect/Engineer will be an integral part of the Contract and will establish interim completion dates for the various activities under the Contract.
 - 2. Should any activity not be completed within 15 days after the stated scheduled date, the Owner shall have the right to require the Contractor to expedite completion of the activity by whatever means the Owner deems appropriate and necessary, without additional compensation to the Contractor.
 - 3. Should any activity be 30 days or more behind schedule, the Owner shall have the right to perform the activity or have the activity performed by whatever method the Owner deems appropriate.
 - 4. Costs incurred by the Owner and by the Architect/Engineer in connection with expediting construction activity under this Article shall be reimbursed by the Contractor.
 - 5. It is expressly understood and agreed that failure by the Owner to exercise the option either to order the Contractor to expedite an activity or to expedite the activity by other means shall not be considered to set a precedent for any other activities.

1.3 SUBMITTALS:

- A. Comply with pertinent provisions of Section 01340.

- B. Preliminary analysis: Within ten calendar days after the Contractor has received the Owner's Notice to

Proceed, submit one reproducible copy of a preliminary construction schedule prepared in accordance with Part 3 of this Section.

- C. Construction schedule: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit one reproducible copy of a construction schedule prepared in accordance with Part 3 of this Section.
- D. Periodic reports: On the first working day of each month following the submittal described in Paragraph 1.3-C above, submit an electronic copy of the construction schedule updated as described in Part 3 of this Section.

PART 2 - PRODUCTS:

2.1 CONSTRUCTION ANALYSIS:

- A. Graphically show by bar-chart the order and interdependence of all activities necessary to complete the Work, and the sequence in which each activity is to be accomplished, as planned by the Contractor and his project field superintendent in coordination with all subcontractors whose work is shown on the diagram.
- B. Include, but not necessarily limit indicated activities to:
 - 1. Project mobilization;
 - 2. Submittal and approval of Shop Drawings and Samples;
 - 3. Procurement of equipment and critical materials;
 - 4. Fabrication of special material and equipment, and its installation and testing.
 - 5. Final cleanup;
 - 6. Final inspecting and testing; and
 - 7. All activities by the Architect/Engineer that effect progress, required dates for completion, or both, for all and each part of the Work.
- C. The schedule shall focus on completing the work in a steady and coordinated effort that minimizes the extent that the site is closed to the public.

PART 3 - EXECUTION:

3.1 PRELIMINARY ANALYSIS:

- A. Contents:
 - 1. Show all activities of the Contractor under this Work for the period between receipt of the Notice to Proceed and submittal of construction schedule required under Paragraph 1.3-C above;
 - 2. Show the Contractor's general approach to remainder of the Work;
 - 3. Show cost of all activities scheduled for performance before submittal and approval of the construction schedule.
- B. Submit in accordance with Paragraph 1.3-B above.

3.2 CONSTRUCTION SCHEDULE:

A. As soon as practicable after receipt of Notice to Proceed, complete the construction analysis in preliminary form, meet with the Architect/Engineer, review contents of the proposed construction schedule, and make all revisions agreed upon.

B. Submit in accordance with Paragraph 1.3-C above.

3.3 PERIODIC REPORTS:

A. As required under Paragraph 1.3-D above, update the approved construction schedule.

1. Indicate "actual" progress in percent completion for each activity;
2. Provide written narrative summary of revisions causing delay in the program, and as explanation of corrective actions taken or proposed.

3.4 REVISIONS:

A. Make only those revisions to approved construction schedule as are approved in advance by the Architect/Engineer.

*******END OF SECTION*******

SECTION 01340
SUBMITTALS AND SUBSTITUTIONS

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: Make submittals required by the Contract Documents, and revise and resubmit as necessary to establish compliance with the specified requirements.
- B. Related Work:
 - 1. Documents affecting work of this section include, but not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Individual requirements for submittals also may be described in pertinent Sections of these Specifications.
- C. Work not included:
 - 1. Non-required submittals will not be reviewed by the Architect/Engineer.
 - 2. The Contractor may require her/his subcontractors to provide drawings, setting diagrams, and similar information to help coordinate the Work, but such data shall remain between the Contractor and her/his subcontractors and will not be reviewed by the Architect/Engineer.

1.2 QUALITY ASSURANCE:

- A. Coordination of submittals:
 - 1. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted.
 - 2. Verify that each item and the submittal for it conform in all respects with the specified requirements.
 - 3. By affixing the Contractor's signature to each submittal, certify that her/his coordination has been performed.
- B. Substitutions:
 - 1. See "Division of Purchases Instruction to Bidders, Public Works Construction."
- C. "Or equal":
 - 1. Where the phrase "or equal," or "or equal as approved by the Architect/Engineer," occurs in the Contract Documents, do not assume that the materials, equipment, or methods will be approved as equal unless the item has been specifically so approved for this Work by the Architect/Engineer.
 - 2. The decision of the Architect/Engineer on the technical merits of a submittal or substitution shall be final.

1.3 SUBMITTALS:

- A. Make submittals of Shop Drawings, Samples, substitution requests, and other items in accordance with the provisions of this Section.

PART 2 - PRODUCTS:

2.1 SHOP DRAWINGS:

- A. Scale and measurements: Make Shop Drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the Work.
- B. Submit electronic copies in PDF format.
 - 1. Shop drawings may be blue-line or black-line
 - 2. Blueprints are not acceptable.
- C. Review comments of the Architect/Engineer will be shown on the shop drawing when it is returned to the Contractor. The Contractor may make and distribute such copies as are required for her/his purposes.

2.2 MANUFACTURERS' LITERATURE:

- A. Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly show which portions of the contents are being submitted for review.
- B. Submit the number of copies which are required to be returned, plus one copy which will be retained by the Architect/Engineer.

2.3 SAMPLES:

- A. Provide Sample or Samples identical to the precise article proposed to be provided. Identify as described under "Identification of submittals" below.
- B. Number of Samples required:
 - 1. Unless otherwise specified, submit Samples in the quantity which is required to be returned, plus one which will be retained by the Architect/Engineer.
 - 2. By prearrangement in specified cases, a single Sample may be submitted for review and, when approved, be installed in the Work at a location agreed upon by the Architect/Engineer.

PART 3 - EXECUTION:

3.1 IDENTIFICATION OF SUBMITTALS:

- A. Consecutively number all submittals.
 - 1. When material is resubmitted for any reason, transmit under a new letter of transmittal and with a new submittal number.
 - 2. On resubmittals, cite the original submittal number for reference.
- B. Accompany each submittal with a letter of transmittal showing all information required for identification and checking.

- C. On at least the first page of each submittal, and elsewhere as required for positive identification, show the submittal number in which the item was included.
- D. Maintain an accurate submittal log for the duration of the Work, showing current status of all submittals at all times. Make the submittal log available to the Architect/Engineer for her/his review upon request.

3.2 GROUPING OF SUBMITTALS:

- A. Unless otherwise specified, make submittals in groups containing all associated items to assure that information is available for checking each item when it is received.
 - 1. Partial submittals may be rejected as not complying with the provisions of the Contract.
 - 2. The Contractor may be held liable for delays so occasioned.

3.3 TIMING OF SUBMITTALS:

- A. Make submittals far enough in advance for scheduled dates for installation to provide time required for reviews, for securing necessary approvals, for possible revisions and re submittals, and for placing orders and securing delivery.
- B. In scheduling, allow at least ten (10) working days for review by the Architect/Engineer following her/his receipt of the submittal.

3.4 ARCHITECT/ENGINEER'S REVIEW:

- A. Review by the Architect/Engineer does not relieve the Contractor from responsibility for errors which may exist in the submitted data.
- B. Revisions:
 - 1. Make revisions required by the Architect/Engineer.
 - 2. If the Contractor considers any required revision to be a change, they shall so notify the Architect/Engineer as provided for in Paragraph 12.3 of the General Conditions.
 - 3. Make only those revisions directed or approved by the Architect/Engineer.

*****END OF SECTION *****

SECTION 01370
SCHEDULE OF VALUES

1.1 DESCRIPTION:

- A. Work included: Provide a detailed breakdown of the agreed contract sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.

- B. Related work:
 - 1. Documents affecting work of the Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Section in Division 1 of these Specifications.
 - 2. Schedule of values is required under Paragraph 9.2 of the General Conditions.
 - 3. Schedule of values is required to be compatible with the "continuation sheet" accompanying applications for payment, as described in Section 01152.

1.2 QUALITY ASSURANCE:

- A. Use required means to assure arithmetical accuracy of the sums described.

- B. When so required by the Architect/Engineer, provide copies of the subcontracts or other data acceptable to the Architect/Engineer.

1.3 SUBMITTALS:

- A. Prior to first application for payment, submit a proposed schedule of values to the Architect/Engineer.
 - 1. Meet with the Architect/Engineer and determine additional data, if any, required to be submitted.
 - 2. Secure the Architect/Engineer's approval of the schedule of values prior to submitting first application for payment.

*****END OF SECTION*****

SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS; TECHNICAL SPECIFICATIONS

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization (e.g., ASTM B564 Standard Specification for Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)
444 North Capital Street, NW, Suite 249
Washington, DC 20001
Ph: 202-624-5800
Fax: 202-624-5806
E-Mail: info@ashto.org
Internet: <https://www.transportation.org/>

AMERICAN CONCRETE INSTITUTE (ACI)
38800 Country Club Drive
Farmington Hills, MI 48331-3439
Ph: 248-848-3700
Fax: 248-848-3701
Internet: <https://www.concrete.org/>

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 610-832-9500
Fax: 610-832-9555
E-mail: service@astm.org
Internet: <https://www.astm.org/>

THE MASONRY SOCIETY (TMS)
105 South Sunset Street, Suite Q
Longmont, CO 80501-6172
Ph: 303-939-9700
Fax: 303-541-9215

Fish Acc. to Fish Passage Fac., Hunts Mill Dam, Ten Mile Riv., RI

E-mail: info@masonrysociety.org
<https://masonrysociety.org/>

U.S. ARMY CORPS OF ENGINEERS (USACE)
CRD-C DOCUMENTS available on Internet:
<http://www.wbdg.org/ffc/army-coe/standards>

Order Other Documents from:

Official Publications of the Headquarters, USACE

E-mail: hqpublications@usace.army.mil

Internet: <http://www.publications.usace.army.mil/>

or

<https://www.hnc.usace.army.mil/Missions/Engineering-Directorate/TECHINFO/>

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

1.1 RELATED DOCUMENTS:

The General Conditions (Special Provisions) and applicable portions of Division 1 of the specifications are a part of this section, which shall consist of all labor, equipment and materials necessary to complete all quality control work indicated on the drawings and herein specified.

1.2 ACCESS:

- A. Block public access to the work area for the prosecution of the work.
- B. Provide all necessary scaffolding, platforms, ladders, ramps, chutes, temporary stairs, and all other access items. Maintain in a safe condition throughout the construction process.

1.3 HOISTING FACILITIES:

- A. Provide hoisting facilities as required for the vertical movement of all materials.
- B. Comply with OSHA and other governing codes for all hoists, conveyors, and elevators and maintain the facilities in compliance with the law.

1.4 GUARDRAILS, DECK AND OTHER OPENINGS:

- A. Provide guardrails, barricades, handrails, and covers for decks and other openings.

1.5 TRASH:

- A. Provide sufficient trash receptacles.
- B. Collect and deposit debris in such collection facilities.
- C. Remove all debris from the job site on a regular basis. Do not allow trash and debris to accumulate or remain on site for longer than 48 hours.

1.6 SANITATION FACILITIES:

- A. Provide adequate temporary toilet facilities.
- B. Maintain such facilities in a clean sanitary condition.

1.7 WEATHER PROTECTION AND TEMPORARY HEAT/VENTILATION:

- A. During construction, provide weather protection for materials which could be damaged by adverse weather conditions.

1.8 OTHER TEMPORARY FACILITIES AND CONTROLS:

A. Protection of Work-In-Place:

1. Thoroughly protect all completed work and all stored materials.
2. Provide boards, cloths, planks, waterproof paper, canvas or other approved protection and use as necessary to prevent any damage.
3. Replace or rectify work or materials damaged by workers, by the elements or by any other cause, to the satisfaction of the Architect/Engineer and at no additional expense to the Owner.
4. Do not allow workers, including those of any subcontractor or supplier to mark finish surfaces with marking pens or other such devices which are not readily erasable.
5. Any damage to permanent work due to failure to control water shall be repaired at Contractor's expense.

B. Special Openings:

1. Early in the work, confer with all parties providing apparatus of various kinds. Should any be of a size and character than cannot properly be taken into the indicated position through openings shown, make necessary arrangements for the installation of such items in a manner satisfactory to those providing them and to the Owner. Make good any damage that may be caused thereby.

C. Project Identification:

1. Request sketch of sign language and graphics from the Owner in sufficient time that sign can be fabricated and erected at start of construction.
2. The Contractor shall provide one 3 foot high by 5 foot wide project sign indicating the project title, contract number, and Wetlands permit number.
3. Sign shall be lettered by a professional sign painter, in accordance with the general layout provided. Lettering shall be gloss vinyl, size, and color as indicated. Surfaces and edges of sign shall receive two coats of exterior primer and two coats of exterior gloss enamel.
4. Submit a shop drawing indicating sign construction and lettering for approval by the Engineer and Owner.
5. The official project title and an electronic file in Autocad drawing format can be provided to the Contractor by the Owner and Engineer upon request.
6. Locate and install the sign at location as specified by the Owner or Engineer.
7. At the completion of the Project, remove the sign and supports completely and restore surface to original condition.

1.9 REMOVAL OF TEMPORARY FACILITIES:

- A. Remove all items indicated above and other construction of a temporary nature from the site as soon as the progress of the work will permit.

B. Recondition the portions of the site so occupied and restore to conditions acceptable to the Architect/Engineer.

*******END OF SECTION*******

SECTION 01640
PRODUCT HANDLING

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: Protect products scheduled for use in the Work by means including, but not necessarily limited to, those described in this Section.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division 1 of these Specifications.
 - 2. Additional procedures also may be prescribed in other Sections of these Specifications.

1.2 QUALITY ASSURANCE:

- A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.3 MANUFACTURERS' RECOMMENDATIONS:

- A. Except as otherwise approved by the Architect/Engineer, determine and comply with manufactures' recommendations on product handling, storage, and protection.

1.4 PACKAGING:

- A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
 - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - 2. Promptly remove damaged material and unsuitable items for the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.
- B. The Architect/Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Architect/Engineer as to manufacturer, grade quality, and other pertinent information.

1.5 PROTECTION:

- A. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.
- B. Provide protection for finished floor surfaces in traffic areas prior to allowing equipment or materials to be moved over such surface.

1.6 REPAIRS AND REPLACEMENTS:

- A. In the event of damage, promptly make replacements and repairs to the approval of the Architect/Engineer and at no additional cost to the Owner.
- B. Additional time required to secure replacements and to make repairs will not be considered by the Architect/Engineer to justify an extension in the Contract Time of Completion.

*******END OF SECTION*******

SECTION 01700
CONTRACT CLOSEOUT

1.1 DESCRIPTION:

- A. Work included: Provide an orderly and efficient transfer of the completed Work to the Owner.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. "Substantial Completion" is defined in Paragraph 9.8.1 of the General Conditions.

1.2 QUALITY ASSURANCE:

- A. Prior to requesting inspection by the Architect/Engineer, use adequate means to assure that the Work is completed in accordance with the specified requirements and is ready for the requested inspection.

1.3 PROCEDURES:

- A. Substantial Completion:
 - 1. Prepare and submit the list required by the first sentence for Paragraph 9.8.2 of the General Conditions.
 - 2. Within a reasonable time after receipt of the list, the Architect/Engineer will inspect or determine status of completion.
 - 3. Should the Architect/Engineer determine that the Work is not substantially complete:
 - a. The Architect/Engineer promptly will so notify the Contractor, in writing, giving the reasons therefore.
 - b. Remedy the deficiencies and notify the Architect/Engineer when ready for reinspection.
 - c. The Architect/Engineer will reinspect the Work.
 - 4. When the Architect/Engineer concurs that the Work is substantially complete:
 - a. The Architect/Engineer will prepare a "Certificate of Substantial Completion" on AIA form G704, accompanied by the Contractor's list of items to be completed or corrected, as verified by the Architect/Engineer.
 - b. The Architect/Engineer will submit the Certificate to the Owner and to the Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.
- B. Final Completion:
 - 1. Prepare and submit the notice required by the first sentence of Paragraph 9.10.1 of the General Conditions.
 - 2. Verify that the Work is complete including, but not necessarily limited to, the items mentioned in Paragraph 9.10.2 of the General Conditions.
 - 3. Certify that:
 - a. Contract Documents have been reviewed;
 - b. Work has been inspected for compliance with the Contract Documents;
 - c. Work has been completed in accordance with the Contract Documents;
 - d. Equipment and systems have been tested as required, and are operational;
 - e. Work is completed and ready for final inspection.
 - 4. The Architect/Engineer will make an inspection to verify status of completion.

5. Should the Architect/Engineer determine that the Work is incomplete or defective:
 - a. The Architect/Engineer promptly will so notify the Contractor, in writing, listing the incomplete or defective work.
 - b. Remedy the deficiencies promptly, and notify the Architect/Engineer when ready for reinspection.
 6. When the Architect/Engineer determines that the Work is acceptable under the Contract Documents, she/he will request the Contractor to make closeout submittals.
- C. Closeout submittals include, but are not necessarily limited to:
1. Operation and maintenance data for items so listed in pertinent other Sections of these Specifications, and for other items when so directed by the Architect/Engineer;
 2. Warranties and bonds;
 3. Keys and keying schedule;
 4. Spare parts and materials extra stock.
 5. Evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:
 - a. Certificates of Inspection;
 - b. Certificates of Occupancy;
 6. Certificates of Insurance for products and completed operations;
 7. Evidence of payment and release of liens;
 8. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends, and holidays.
 9. As-built drawings clearly indicating major deviations from original design and specification.
- D. Final adjustment of accounts:
1. Submit a final statement of accounting to the Architect/Engineer, showing all adjustments to the Contract Sum.
 2. If so required, the Architect/Engineer will prepare a final Change Order showing adjustments to the Contract Sum which were not made previously by Change Orders.

1.4 INSTRUCTION:

- A. Instruct the Owner's personnel in proper operation and maintenance of systems, equipment, and similar items which were provided as part of the Work.

*******END OF SECTION*******

SECTION 01710
CLEANING

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: Throughout the construction period, maintain the structures and site in a standard of cleanliness as described in this Section.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other Section of these Specifications.

1.2 QUALITY ASSURANCE:

- A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.
- B. In addition to the standards described in this Section, comply with pertinent requirements agencies having jurisdiction.

PART 2 - PRODUCTS:

2.1 CLEANING MATERIALS AND EQUIPMENT:

- A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.2 COMPATIBILITY:

- A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 - EXECUTION:

3.1 PROGRESS CLEANING:

- A. General:
 - 1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic and providing required protection of materials.
 - 2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
 - 3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.

4. Provide adequate storage or containment for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.

B. Site:

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements of stored items to meet the requirements of subparagraph 3.1-A-1 above.
3. Maintain the site in a neat and orderly condition at all times.

C. Structures:

1. Weekly, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.
3. Follow the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials are installed.
 - a. "Clean" for the purpose of the subparagraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Architect/Engineer, may be injurious to the finish floor material.

3.2 FINAL CLEANING:

- A. "Clean," for the purposed of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials and appropriate to the nature of the site.
- B. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.1 above.
- C. Site:
 1. Unless otherwise specifically directed by the Architect/Engineer, broom clean paved areas on the site and public paved areas adjacent to the site.
 2. Completely remove resultant debris.
- D. Structures:
 1. Exterior
 - a. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
 - b. Remove all traces of splashed materials from adjacent surfaces.
 - c. If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.
 - d. In the event of stubborn stains not removable with water, the Architect/Engineer may require light sandblasting or other cleaning at no additional cost to the Owner.

2. Interior:

- a. Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
- b. Remove all traces of splashed materials from adjacent surfaces.
- c. Remove paint droppings, spots, stains, and dirt from finished surfaces.

E. Schedule final cleaning as approved by the Architect/Engineer to enable the Owner to accept a completely clean Work.

3.3 CLEANING DURING OWNER'S OCCUPANCY:

A. Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by the Architect/Engineer in accordance with the General Conditions of the Contract.

*******END OF SECTION*******

SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included:
 - 1. Throughout progress of the Work, maintain an accurate record of changes in the Contract Documents, as described in Part 3.1 below.
 - 2. Upon completion of the Work, transfer the recorded changes to a set of Record Documents, as described in Part 3.2 below.

- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Other requirements affecting Project Record Documents may appear in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE:

- A. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved by the Architect/Engineer.

- B. Accuracy of records:
 - 1. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of the Specification and each sheet of the Drawings and other Documents where such entry is required to show the change properly.
 - 2. Accuracy of records shall be such that future search for items shown in the Contract Documents may rely reasonably on information obtained from the approved Project Record Documents.

- C. Make entries within twenty-four (24) hours after receipt of information that the change has occurred.

1.3 SUBMITTALS:

- A. Comply with pertinent provisions of Section 01340.

- B. The Architect/Engineer's approval of the current status of Project Record Documents may be a prerequisite to the Architect/Engineer's approval of requests for progress payment and request for final payment under the Contract.

- C. Prior to submitting each request for progress payment, secure the Architect/Engineer's approval of the current status of the Project Record Documents.

- D. Prior to submitting request for final payment, submit the final Project Record Documents to the Architect/Engineer and secure his approval.

1.4 PRODUCT HANDLING:

- A. Maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer of all recorded data to the final Project Record Documents.
- B. In the event of loss of recorded data, use means necessary to again secure the data to the Architect/Engineer's approval.
 - 1. Such means shall include, if necessary in the opinion of the Architect/Engineer, removal and replacement of concealing materials.
 - 2. In such case, provide replacements to the standards originally required by the Contract Documents.

PART 2 - PRODUCTS:

2.1 RECORD DOCUMENTS:

- A. Job Set: Promptly following receipt of the Owner's Notice to Proceed, secure from the Architect/Engineer at no charge to the Contractor one complete set of all Documents comprising the Contract.
- B. Final Record Documents: At a time nearing the completion of the Work, secure from the Architect/Engineer at no charge to the Contractor one complete set of sepia transparencies of all Drawings in the Contract.

PART 3 - EXECUTION:

3.1 MAINTENANCE OF JOB SET:

- A. Immediately upon receipt of the job set described in Paragraph 2.1-A above, identify each of the Documents with the title, **"RECORD DOCUMENTS - JOB SET."**
- B. Preservation:
 - 1. Considering the Contract completion time, the probable number of occasions upon the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Architect/Engineer.
 - 2. Do not use the job set for any purpose except entry of new data and for review by the Architect/Engineer, until start of transfer to date to final Project Record Documents.
 - 3. Maintain the job set at the site of Work as that site is designated by the by the Architect/Engineer.
- C. Making entries on Drawings:
 - 1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by graphic line and note as required.
 - 2. Date all entries.
 - 3. Call attention to the entry by a "cloud" drawn around the area or areas affected.
 - 4. In the event of overlapping changes, use different colors for the overlapping changes.

- D. Make entries in the pertinent other Documents as approved by the Architect/Engineer.
- E. Conversion of Schematic Layouts:
 - 1. In some cases on the Drawings, arrangements of conduits, piping, ducts and similar items, is shown schematically and is not intended to portray precise layout.
 - a. Final physical arrangement is determined by the Contractor, subject to the Architect/Engineer's approval.
 - b. However, design of future modifications of the facility may require accurate information as to the final physical layout of items which are shown only schematically on the Drawings.
 - 2. Show on the job set of Record Drawings, by dimension accurate to within one inch, the centerline of each run of items such as are described in subparagraph 3.1-E-1 above.
 - a. Clearly identify the item by accurate note such as "cast iron drain," "galv. water," and the like.
 - b. Show, by symbol or note, the vertical location of the item ("under slab," "exposed," and the like).
 - c. Make all identification sufficiently descriptive that it may be related reliably to the Specifications.
 - 3. The Architect/Engineer may waive the requirements for conversion of schematic layouts where, in the Architect/Engineer's judgment, conversion serves no useful purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Architect/Engineer.

3.2 FINAL PROJECT RECORD DOCUMENTS:

- A. The purpose of the final Project Record Documents is to provide information regarding all aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive site measurement, investigation, and examination.
- B. Approval of recorded data prior to transfer:
 - 1. Following receipt of the transparencies described in Paragraph 2.1-B above, and prior to start of transfer of recorded data thereto, secure the Architect/Engineer's approval for all required revisions.
- C. Transfer of data to Drawings:
 - 1. Carefully transfer change data shown on the job set of Record Drawings to the corresponding transparencies, coordinating the changes as required.
 - 2. Clearly indicate at each affected detail and other Drawing a full description of changes made during construction, and the actual location of items described in subparagraph 3.1-E-1 above.
 - 3. Call attention to each entry by drawing a "cloud" around the area or areas affected.
 - 4. Make changes neatly, consistently, and with the proper media to assure longevity and clear reproduction.
- D. Transfer of data to other Documents:
 - 1. If the Documents other than the Drawings have been kept clean during progress of the Work, and if entries thereon have been orderly to the approval of the Architect/Engineer, the job set of those Documents other than the Drawings will be accepted as final Record Documents.
 - 2. If any such Document is not so approved by the Architect/Engineer, secure a new copy of that Document from the Architect/Engineer at the Architect/Engineer's usual charge for reproduction and handling, and carefully transfer the change data to the new copy to the approval of the Architect/Engineer.
- E. Review and Submittal:

1. Submit the completed set of Project Record Documents to the Architect/Engineer as described in Paragraph 1.3-D above.
2. Participate in review meetings as required.
3. Make required changes and promptly deliver the final Project Record Documents to the Architect/Engineer.

3.3 CHANGES SUBSEQUENT TO ACCEPTANCE:

- A. The Contractor has no responsibility for recording changes in the Work subsequent to Final Completion, except for changes resulting from work performed under Warranty.

*******END OF SECTION *******

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DIVISION 02 - EXISTING CONDITIONS

SECTION 02 40 00

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-- End of Section Table of Contents --

SECTION 02 40 00

CONTROL OF WATER

PART 1 GENERAL

1.1 SUMMARY

Work consists of providing all supervision, labor and materials, and plant and equipment necessary for designing, furnishing, installing, maintaining, operating and removing temporary systems for the control of water as required to lower and control water levels and hydrostatic pressures during construction; disposing of pumped water; constructing, maintaining, observing, and removing of temporary water control systems.

1.2 REFERENCES

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

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) Safety and Health Requirements Manual

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01340 SUBMITTALS AND SUBSTITUTIONS:

SD-01 Preconstruction Submittals

Water Control Plan; G

The Contractor shall provide a water control plan describing methods by which water flows can be controlled and diverted during construction. The design details shall include provisions for dewatering including, but not limited to, temporary cofferdams, sumps, pumps, erosion and seepage control measures, and provisions for emergency controls as necessary and as outlined in this section.

SD-01 Preconstruction Submittals

Design Details and Calculations; G

The Contractor shall engage the services of a Registered Professional Engineer, experienced in this type of work, to develop design details and supporting calculations for all steel sheet piling, diversion structures, or earth support systems as may be required. The engineer shall also develop design details showing all pertinent dimensions, elevations, slopes, slope

protection, and materials for earth cofferdams and excavations. The design details shall include provisions for dewatering including, but not limited to ditches, sumps, well points, pumps, and erosion and seepage control measures, as necessary.

1.4 FLOW DATA

Information regarding flows and flood data for the Ten Mile River project area is attached at the end of this section.

1.5 DEFINITIONS

1.5.1 Control of Water Systems

Structures constructed to prevent water from inundating specific construction areas during the execution of the work.

1.5.2 Sediment Control Device

Temporary settling tank or excavated pond, dewatering trap, or temporary sediment control measure.

1.5.3 Natural Attenuation Area

Dry flat-grassed or open area with existing vegetation that is not subject to erosion.

1.6 CONTROL

Adequate control shall be maintained to ensure that the stability of disturbed and excavated areas are not adversely affected by water, that erosion is controlled and that flooding of excavation or work area or damage to structures does not occur.

1.7 DESIGN AND CONSTRUCTION MEASURES

1.7.1 [Water Control Plan](#)

The Contractor shall submit a proposed Water Control Plan to include a construction sequence, a water control plan, [Design Details and Calculations](#), and a water quality compliance plan for review to the Contracting Officer.

The Water Control Plan shall be comprised of controlling surface water, subsurface water, and water passing through the work areas, not only to allow construction to take place and to protect structures, but to minimize environmental impacts to adjacent wetlands and downstream. All work shall be in accordance with the requirements of [EM 385-1-1](#).

1.7.2 Drainage

a. Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of storm events to keep soil materials sufficiently dry. Grade the construction area to provide positive surface water runoff away from the construction activity and or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop,

remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

b. The collection method and pump characteristics shall be submitted for approval as part of the Water Control. The plan shall include provisions to control surface water and groundwater. At times between rainfall events, the groundwater levels will typically be at an elevation equal to the stream bed elevation.

1.7.3 Power for Operations

Provide power for operations and standby equipment and standby power supply to maintain continuous control of water. The Contractor shall investigate the suitability of this power source for pumps to be used in water control measures, and is advised to consider the use of generators as a source of electric power.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Provide pumps, pipe, appliances, materials and equipment of capacity capable of controlling and diverting water as necessary to complete the work as specified under this contract. Standby pumping units and equipment shall be maintained at the site in case of failure of primary pumping units.

2.2 TEMPORARY CONTROL OF WATER SYSTEM

The Contractor shall provide an efficient temporary control of water system to allow safe prosecution of the work under this contract. The Contractor may propose an equivalent construction method for approval at no additional cost to the Government.

Minimum top elevation of the upstream cofferdam system shall be set at elevation of 23.5 feet NAVD 88. Minimum top elevation of the downstream cofferdam system shall be set at elevation 20.00 feet NAVD 88.

PART 3 EXECUTION

3.1 DEWATERING

The work areas shall be dewatered and maintained in a dry condition to the extent required to construct the work in accordance with all applicable provisions in other sections of the specifications and to maintain the integrity of the structures.

Any subsurface water collected within the control of water system shall go through a filtering process to remove suspended sediment before discharge back to the river.

3.2 DISPOSAL OF WATER

Water shall be collected, treated, and disposed of so as not to be injurious to public health or safety, property, the environment, fisheries, or any part of the work completed or under construction. Pumping operations shall direct the water through a sediment control

device prior to discharging. The sediment control device shall be placed in an upland natural attenuation area. The natural attenuation area shall be setback at least 100 feet from any receiving watercourses. Disposal shall be done in a manner that does not cause erosion or other damage to adjacent lands.

3.3 MAINTENANCE

The Contractor shall continuously monitor all control of water systems for evidence of movement, deterioration, and excessive seepage throughout their use. The control of water systems shall be maintained in good working order as directed and as necessary for the safety of work-personnel and the protection of the permanent work.

3.4 EMERGENCY BREACHING AND REMOVAL OF CONTROL OF WATER SYSTEMS

During all time periods when control of water and diversion systems are in operation, the Contractor shall provide and maintain at the site suitable equipment for the breaching of cofferdams and removal of equipment for the passage of water during flood conditions. The removal and breaching of control of water systems shall be done only at the direction of, or with the approval of, the Contracting Officer.

-- End of Section --

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SECTION 03 01 32

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SECTION 03 01 32

CONCRETE REHABILITATION

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Grout

A mixture of binder material and water, with or without a filler.

1.1.2 Cement-Based Material

A material consisting of portland cement and/or other cementitious materials as a binder and aggregate. As used in this specification, cement-based materials do not include materials with polymer modifiers.

1.2 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 301 (2016) Specifications for Structural Concrete

ACI SP-66 (2004) ACI Detailing Manual

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M (2019) Standard Specification for Carbon Structural Steel

ASTM A615/A615M (2016) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM A996/A996M (2016) Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement

ASTM A1064/A1064M (2017) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

ASTM C1602/C1602M (2018) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete

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

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01340 SUBMITTALS AND SUBSTITUTIONS:

SD-03 Product Data

Non-Shrink Grout; G, RO

Reinforcing Steel; G, RO

SD-06 Test Reports

Non-Shrink Grout; G, RO

Water; G, RO

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Water

Water for cleaning, mixing and curing shall be in compliance with the requirements of [ASTM C1602/C1602M](#) and shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali. Submit test report showing water complies with [ASTM C1602/C1602M](#).

2.1.2 Reinforcing Steel

Provide reinforcing bars conforming to the requirements of [ASTM A615/A615M](#), Grade 60, deformed. Provide welded steel wire reinforcement conforming to the requirements of [ASTM A1064/A1064M](#). Detail reinforcement not indicated in accordance with [ACI 301](#) and [ACI SP-66](#). Provide mechanical reinforcing bar connectors in accordance with [ACI 301](#) and provide 125 percent minimum yield strength of the reinforcement bar.

Reinforcement must be free from loose, flaky rust and scale, and free from oil, grease, or other coating which might destroy or reduce the reinforcement's bond with the grout.

2.1.3 Dowels

In accordance with [ASTM A615/A615M](#), [ASTM A996/A996M](#), and [ASTM A36/A36M](#).

2.1.4 Nonshrink Grout

Provide nonshrink grout conforming to [ASTM C1107/C1107M](#), and a commercial formulation suitable for the proposed application.

Design the grout mixtures to produce material having an average compressive strength of 2,000 psi at 28 days of age.

2.1.5 Cement-Based Grout

Cement-based grout shall consist of equal parts of Type I or II portland

cement and sand by dry weight, and water-reducing admixture, thoroughly mixed with water to yield a thick, creamy mixture. The water-cementitious materials ratio shall not be greater than 0.45 by weight. The sand shall meet the requirements of the fine aggregate specified herein, except 100 percent shall pass a No. 8 sieve.

2.2 GROUT MIXING EQUIPMENT

Use a high-speed, high-shear, colloidal type grout mixer capable of continuous mechanical mixing that will produce uniform and thoroughly mixed grout which is free of lumps and undispersed cement. The mixer shall be equipped with a suitable water and admixture measuring devices calibrated to read in cubic feet and tenths and so designed that after each delivery the device can be conveniently set back to zero.

2.3 DRILLING EQUIPMENT

Use percussion or rotary drilling equipment of a type suitable for the depth, diameter and rock to be drilled. Use only rotary drilling equipment where vibration from percussion drilling could damage the rock. Use equipment capable of maintaining the required alignment.

PART 3 EXECUTION

3.1 ANCHORING AND REINFORCING

3.1.1 Reinforcing Steel

A 1.25 inch diameter hole by 10 inches deep shall be drilled to anchor #6 reinforcing steel to the existing rock (bottom of river channel). The reinforcing dowels shall be embedded into the rock a depth of 8 inches. Holes shall be thoroughly cleaned and damp, prior to grout filling.

3.1.2 Drilling and Grouting Dowels and Anchors

Drill holes for dowels and anchors using drilling equipment suitable for the intended purpose, as approved by the Contracting Officer. Diameter of holes shall be 1.25 inches. Clean holes by flushing with water and compressed air prior to placing grout. Anchor #6 epoxy coated reinforcing bars with cement-based grout. Remove excess grout after the dowel has been set in place.

3.1.3 Installing Reinforcement

Place reinforcement steel and accessories as specified and as shown on the contract drawings.

3.2 MIXING MATERIALS

Make batches small enough to ensure placement before grout sets. Mix materials in accordance with manufacturer's recommendations.

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UNIT MASONRY

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.

ASTM INTERNATIONAL (ASTM)

- | | |
|-----------------|--|
| ASTM C207 | (2018) Standard Specification for Hydrated Lime for Masonry Purposes |
| ASTM C270 | (2019a; E 2019) Standard Specification for Mortar for Unit Masonry |
| ASTM C780 | (2020) Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry |
| ASTM C979/C979M | (2016) Standard Specification for Pigments for Integrally Colored Concrete |
| ASTM C1384 | (2012a) Standard Specification for Admixtures for Masonry Mortars |

THE MASONRY SOCIETY (TMS)

- | | |
|----------|--|
| TMS MSJC | (2016) Masonry Standard Joint Committee's (MSJC) Book - Building Code Requirements and Specification for Masonry Structures, Containing TMS 402/ACI 530/ASCE 5, TMS 602/ACI 530.1/ASCE 6, and Companion Commentaries |
|----------|--|

1.2 SUBMITTALS

Approval is required for submittals with a "G" classification. Submittals not having a "G" are for information only. Submit the following in accordance with Section 01340 SUBMITTALS AND SUBSTITUTIONS:

SD-03 Product Data

Hot Weather Procedures; G

Cold Weather Procedures; G

SD-06 Test Reports

Field Testing of Mortar; G

SD-07 Certificates

Cementitious Materials

SD-08 Manufacturer's Instructions

Admixtures for Masonry Mortar

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver, store, handle, and protect material to avoid contact with soil or contaminating material. Store and prepare materials in already disturbed areas to minimize project site disturbance and size of project site.

1.3.1 Cementitious Materials, Sand and Aggregates

Deliver cementitious and other packaged materials in unopened containers, plainly marked and labeled with manufacturers' names and brands. Store cementitious material in dry, weathertight enclosures or completely cover. Handle cementitious materials in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. Store sand and aggregates in a manner to prevent contamination and segregation.

1.4 PROJECT/SITE CONDITIONS

Conform to TMS MSJC for hot and cold weather masonry work.

1.4.1 Hot Weather Procedures

When ambient air temperature exceeds 100 degrees F, or exceeds 90 degrees F and the wind velocity is greater than 8 mph, comply with TMS MSJC Article 1.8 D for: preparation prior to conducting masonry work; construction while masonry work is in progress; and protection for newly completed masonry.

1.4.2 Cold Weather Procedures

When ambient temperature is below 40 degrees F, comply with TMS MSJC Article 1.8 C for: preparation prior to conducting masonry work; construction while masonry work is in progress; and protection for newly completed masonry.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Mortar Materials

2.1.1.1 Cementitious Materials

Provide cementitious materials that conform to those permitted by ASTM C270.

2.1.1.2 Hydrated Lime and Alternates

Provide lime that conforms to one of the materials permitted by ASTM C207 for use in combination with portland cement, hydraulic cement, and blended hydraulic cement. Do not use lime in combination with masonry cement or mortar cement.

2.1.1.3 Admixtures for Masonry Mortar

In cold weather, use a non-chloride based accelerating admixture that conforms to [ASTM C1384](#), unless Type III portland cement is used in the mortar. Mortar shall have 5-7% air entrainment.

2.1.1.4 Aggregate and Water

Provide aggregate (sand) and water that conform to materials permitted by [ASTM C270](#).

2.2 MORTAR MIXES

2.2.1 Mortar Mix

- a. Provide mortar Type S unless specified otherwise herein. Do not use masonry cement in the mortar. Do not use air-entrainment in the mortar.
- b. Use [ASTM C270](#) Type S cement-lime mortar or mortar cement mortar for seismic-force-resisting elements indicated.
- c. Provide mortar that conforms to [ASTM C270](#). Use Type S mortar for grouting of leveling fill and attachment of capstone slabs to top of gabion weirs.
- d. For field-batched mortar, measure component materials by volume. Use measuring boxes for materials that do not come in packages, such as sand, for consistent batching. Mix cementitious materials and aggregates between 3 and 5 minutes in a mechanical batch mixer with a sufficient amount of water to produce a workable consistency. Do not hand mix mortar unless approved by the Contracting Officer. Maintain workability of mortar by remixing or retempering. Discard mortar that has begun to stiffen or is not used within 2-1/2 hours after initial mixing.
- e. For preblended mortar, follow manufacturer's mixing instructions.
- f. The color of mortar in its fully cured state, shall match the color the Leveling Fill included in Section [31 00 00 EARTHWORK](#). The coloring pigment shall meet the requirements of [ASTM C979/C979M](#). The mortar color shall be approved by the Contracting Officer.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

3.1.1 Tests

3.1.1.1 Field Testing of Mortar

Perform mortar testing at the following frequency: one time per each truck delivery. For each required mortar test, provide a minimum of three mortar samples. Perform initial mortar testing prior to construction for comparison purposes during construction.

Mortar shall achieve a compressive strength of 3000 psi @30 days.

Fish Acc. to Fish Passage Fac., Hunts Mill Dam, Ten Mile Riv., RI

Prepare and test mortar samples for mortar aggregate ratio in accordance with ASTM C780 Appendix A4. Prepare and test mortar compressive strength specimens in accordance with ASTM C780 Appendix A6.

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SECTION 31 00 00

EARTHWORK

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 180 (2017) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

AASHTO T 224 (2010) Standard Method of Test for Correction for Coarse Particles in the Soil Compaction Test

ASTM INTERNATIONAL (ASTM)

ASTM C33/C33M (2016) Standard Specification for Concrete Aggregates

ASTM C39/C39M (2021) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

ASTM C150/C150M (2021) Standard Specification for Portland Cement

ASTM C260/C260M (2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete

ASTM C494/C494M (2019) Standard Specification for Chemical Admixtures for Concrete

ASTM C940 (2016) Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory

ASTM C979/C979M (2016) Standard Specification for Pigments for Integrally Colored Concrete

ASTM D1557 (2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2700 kN-m/m³)

ASTM D2487 (2017) Standard Practice for

Classification of Soils for Engineering
Purposes (Unified Soil Classification
System)

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

State Specifications

(2018) Standard Specifications for Road
and Bridge Construction

1.2 DEFINITIONS

1.2.1 Satisfactory Materials

Satisfactory materials comprise any materials classified by [ASTM D2487](#) as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SP-SM, and SW-SM. Satisfactory materials for grading comprise stones less than 4 inches in any dimension.

1.2.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter or frozen material. Notify the Contracting Officer when encountering any contaminated materials.

1.2.3 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum density obtained by the test procedure presented in [ASTM D1557](#) abbreviated as a percent of laboratory maximum density. Since [ASTM D1557](#) applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, express the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve as a percentage of the maximum density in accordance with [AASHTO T 180](#) and corrected with [AASHTO T 224](#). To maintain the same percentage of coarse material, use the "remove and replace" procedure as described in NOTE 8 of Paragraph 7.2 in [AASHTO T 180](#).

1.2.4 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01340 SUBMITTALS AND SUBSTITUTIONS:

SD-01 Preconstruction Submittals

Shoring; G

Procedure and location for shoring during construction, if shoring is necessary.

Leveling Fill; G

Flowable Fill; G

Source of Materials; G

The source provider(s) name and location and suppliers gradation test reports for all soil materials used on the project shall be provided.

SD-04 Samples

Material Samples; G

The Contractor shall submit 50 pound samples for each soil material, prior to placing orders and delivery to the site.

SD-06 Test Reports

Laboratory and Field Test Results

Within 24 hours of conclusion of physical tests, one hard copy and one electronic copy of test results shall be submitted, including calibration curves and results of calibration tests.

SD-07 Certificates

Quality Control Testing

Qualifications of the commercial testing laboratory or Contractor's testing facilities.

PART 2 PRODUCTS

2.1 LEVELING FILL

Leveling Fill material shall conform to the requirements of Section M.10.03 of the [State Specifications](#). Gradation of the material shall be as specified for R-2 Graded Rip Rap Stone in Section M.10.03.2 of the [State Specifications](#).

2.2 FLOWABLE FILL

Provide flowable fill containing, at a minimum, cementitious materials and water. Cementitious materials shall be portland cement, pozzolanic materials, or other self-cementing materials, or combinations thereof, at the Contractor's option. The flowable fill mix design may also contain fine aggregate or filler, and/or chemical admixtures in any proportions such that the final product meets the strength, flow consistency and shrinkage requirements included in this specification. Provide equipment as recommended by the Manufacturer and comply with manufacturer's

recommendations for the addition of additives, whether at the production plant or prior to placement at the site.

Portland Cement: [ASTM C150/C150M](#), Type 1 or Type 2.
Mixing Water: Fresh, clean, and potable.
Air Entraining Admixture: [ASTM C260/C260M](#).
Chemical Admixtures: [ASTM C494/C494M](#).
Aggregate: [ASTM C33/C33M](#).

Mix design shall produce a consistency that will result in a flowable product at the time of placement which meets the placement requirements of [31 36 01 WIRE MESH GABIONS](#), Subpart 3.4 INSTALLATION AND FILLING. Flowable fill shall be low slump (no greater than 3") to prevent loss of fill through the sides of the gabion baskets upon installation. Flowable fill shall have a minimum strength of 300 psi according to [ASTM C39/C39M](#) at 28 days after placement. Flowable fill shall have minimal subsidence and bleed water shrinkage. Evaporation of bleed water shall not result in shrinkage of more than 1/8 inch per foot of flowable fill depth (for mixes containing high fly ash content). Measurement of a Final Bleeding shall be as measured in Section 10 of [ASTM C940](#).

Flowable fill shall have a unit weight of: 90 - 115 pounds per cubic foot (lbs/cf) in which fly ash is used as filler material; 115 - 145 pounds per cubic foot with high sand filler content. Unit weight shall be measured at the point of placement after a 60 minute ready-mix truck ride. In the absence of strength data the cementitious content shall be a maximum of 150 lbs/cf.

The color of flowable fill, in its fully cured state, shall match the color the adjacent stone fill. The coloring pigment shall meet the requirements of [ASTM C979/C979M](#). The flowable fill color shall be approved by the Contracting Officer.

2.3 SAMPLING AND TESTING

2.3.1 [Source of Materials](#)

Leveling Fill and Flowable Fill materials shall be approved material conforming to the specified requirements and gradation. At least 30 days prior to the initial placement of any fill material, the Contractor shall submit the locations of the proposed sources and the names of the processing firms.

2.3.2 [Material Samples](#)

A 50 pound bulk sample of each material shall be submitted for approval of gradation and for approval of the soundness and durability of the stone, gravel, and sand particles. Test samples shall be representative samples taken in the presence of the Contracting Officer. Testing of each material for compliance with part "Soil Materials" shall be performed by the Contractor's approved testing laboratory and shall be submitted with the bulk sample for approval.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

Subgrade is defined as the surface material on which the new Leveling Fill is to be placed. Prior to placement of fill materials, all soft and

yielding material shall be removed. No fill material shall be placed on any subgrade until the area has been inspected and approved by the Contracting Officer.

3.2 FINISHING AND PROTECTION OF SUBGRADES AND BACKFILL

3.2.1 Finishing

Finish the surface of excavations and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections shown on the contract drawings. Provide the degree of finish for graded areas within 0.1 foot of the grades and elevations indicated. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

3.3 FILL PLACEMENT

3.3.1 Leveling Fill

Leveling fill shall be placed to the lines and grades specified in the contract drawings. Leveling fill shall be placed on the prepared subgrade. Stone shall be mixed with mortar meeting the requirements of specification section 04 20 00 UNIT MASONRY to minimize voids to create an integrally connected mass and minimize seepage through the fill. Leveling Fill shall be placed by equipment suitable for lifting, manipulating, and placing stone of the size specified. Hand tamp and/or use plate compactor to consolidate to minimize void space. The final surface of the leveling fill shall be a smooth surface meeting the requirements of paragraph FINISHING.

3.4 QUALITY CONTROL TESTING

3.4.1 General

Quality control testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Tests shall be performed by an approved commercial testing laboratory, or by the Contractor subject to approval of the Contracting Officer. Sampling and testing shall be repeated as necessary and as directed to ensure the materials are in compliance with the specifications. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.4.2 Optimum Moisture and Laboratory Maximum Density

Optimum moisture and laboratory maximum density tests shall be performed in accordance with ASTM D1557. A soil gradation test shall be performed on each sample tested.

3.4.3 Laboratory and Field Test Results

Copies of all laboratory and field test reports shall be submitted to the Contracting Officer within 24 hours of completion of the test. The recording forms shall include all data collected, calculations, final test results, compaction equipment, number of passes, layer thicknesses,

recommendations and changes made in the field based on the test results, the weather conditions, type and number of tests, test instrument calibration data, and any other pertinent data. The Contractor shall maintain current copies of the test reports at the project field office for the duration of the project.

-- End of Section --

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SECTION 31 36 01

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Fish Acc. to Fish Passage Fac., Hunts Mill Dam, Ten Mile Riv., RI

-- End of Section Table of Contents --

SECTION 31 36 01

WIRE MESH GABIONS

PART 1 GENERAL

1.1 SUMMARY

The work under this specification includes furnishing, assembling, filling and tying open wire mesh rectangular compartmented gabions placed in accordance with the lines, grades, and dimensions shown or otherwise established in the field.

- a. Gabions are wire mesh containers of variable sizes, uniformly partitioned into internal cells, interconnected with other similar units, and filled with stone at the project site to form flexible, permeable, monolithic structures. Gabions shall be manufactured with all components mechanically connected at the production facility with the exception of the mattress lid, which is produced separately from the base. The supply to the jobsite of unassembled individual wire mesh components (panels) forming gabions will not be permitted.
- b. Definitions of terms specific to this specification and to all materials furnished on the jobsite, with the exception of the rock to fill the baskets and the filter material, shall refer and be in compliance with [ASTM A975](#) for double twisted wire mesh gabions.

1.2 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.

ASTM INTERNATIONAL (ASTM)

ASTM A313	(2017) Standard Specification for Stainless Steel Spring Wire
ASTM A370	(2017a) Standard Test Methods and Definitions for Mechanical Testing of Steel Products
ASTM A641	(2019) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
ASTM A764	(2007; R 2017) Standard Specification for Metallic Coated Carbon Steel Wire, Coated at Size and Drawn to Size for Mechanical Springs
ASTM A975	(2011; R 2021) Standard Specification for Double-Twisted Hexagonal Mesh Gabions and Revet Mattresses (Metallic-Coated Steel Wire or Metallic-Coated Steel Wire With Poly(Vinyl Chloride) (PVC) Coating)

ASTM B117	(2016) Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM C136	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C33	(2016) Standard Specification for Concrete Aggregates
ASTM D412	(2016) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
ASTM D746	(2014) Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
ASTM D792	(2013) Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM D1499	(2013) Filtered Open-Flame Carbon-Arc Type Exposures of Plastics
ASTM D2240	(2015; E 2017) Standard Test Method for Rubber Property - Durometer Hardness
ASTM D5312	(2012; R 2013) Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions
ASTM D5519	(2015) Particle Size Analysis of Natural and Man-Made Riprap Materials
ASTM G152	(2013) Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

State Specifications	(2018) Standard Specifications for Road and Bridge Construction
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1.3 DEFINITIONS

1.3.1 Rate of Aggressiveness

The determination of the rate of aggressiveness (non-aggressive, moderately, or highly aggressive) shall be made on a project-to-project basis, due to the many variables involved and the lack of criteria of general validity. It is normally recommended for the choice to be based on all the available data and on the experience of existing gabion structures in similar environments.

1.3.2 Double Twisted Wire Mesh Gabions

Classified according to the wire coating, which is applied prior to manufacturing the mesh. Coating styles are as follows:

1.3.2.1 Style 3

Wire mesh, lacing wire, and stiffeners as Style 1 and overcoated with PVC. Fasteners shall be of stainless steel wire. Style 3 for the wire coating is normally recommended for both permanent and temporary gabion structures, for works installed in aggressive or polluted environments, or when the aggressiveness of the site is moderately unpredictable or variable from low to high.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01340 SUBMITTALS AND SUBSTITUTIONS:

SD-03 Product Data; G

Gabions

SD-04 Samples

Gabions

Alternative Wire Fasteners

SD-06 Test Reports

Gabions

Alternative Wire Fasteners; G

SD-07 Certificates

Stone Fill

1.5 QUALITY ASSURANCE

1.5.1 Samples

Furnish samples of materials used to fabricate the gabions to the Contracting Officer 60 days prior to start of installation. Samples will be tested in accordance with specification and ASTM A975. The Government reserves the right to test additional samples to verify the submitted test records at the Government's expense. When the first test results indicate that the fasteners do not meet the specified requirements, the additional test will be at the Contractor's expense. The fasteners will be rejected after two tests failing to meet the requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

Gabions shall be delivered as follows:

- a. With all components mechanically connected at the production facility. All gabions are supplied in the collapsed form, either folded or bundled or rolled, for shipping. Bundles are banded together at the factory for ease of shipping and handling.
- b. Labeled in bundles. Labels shall show the dimensions of the gabions

included, the number of pieces and the color code.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Double Twisted Wire Mesh Gabions

Double twisted wire mesh gabions shall be Style 3 manufactured with a non-raveling mesh made by twisting continuous pairs of wires through three half turns (commonly called double twisted) to form a hexagonal-shaped opening. Gabion sizes, wire diameters, mesh opening sizes, and tolerances shall comply with the requirements of [ASTM A975](#) (Tables 1, 3, 4, 5, 6 and Section 9).

Gabions shall meet the following test requirements:

- (1) Metallic Coating: The coating weights shall conform to the requirements of [ASTM A641](#), Class 3 (Style 1).
- (2) Wire Tensile Strength: The tensile strength of the wire used for the double twisted mesh, lacing wire, and stiffener, when tested in accordance with Test Methods and definitions [ASTM A370](#), shall be in accordance with the requirements of [ASTM A641](#) (Style 1)
- (3) Mesh Strength and Panel to Panel Joint Strength: The minimum strength requirements of the mesh, selvedge wire to mesh connection, panel to panel connection, and punch test, when tested in accordance with [ASTM A975](#) Section 13.1, shall be as shown in Table 1. The strength values reported in [lb/ft](#) are referred to the unitary width of the specimen. The panel to panel test shall demonstrate the ability of the fastening system to achieve the required strength, and indicate the number of wire revolutions for the lacing wire or the ring spacing for ring fasteners used. The same number of wire revolutions or ring spacing shall be used in the field installation. Pleating the based panel to obtain internal panels is prohibited.

TABLE 1 (Minimum Strength Requirements of Mesh and Connections)	
Test Description	Gabions, PVC Coated
Tensile strength parallel to twist	2900 lb/ft
Tensile strength perpendicular to twist	1400 lb/ft
Connection to selvedges	1200 lb/ft
Panel to panel (using lacing wire or ring fasteners)	1200 lb/ft
Punch Test	5300 lb

2.1.2 PVC for Coating

The PVC coating shall show no cracks or breaks after the wires are twisted in the fabrication of the mesh. The initial properties of PVC coating material shall have a demonstrated ability to conform to the following

requirements:

2.1.2.1 Specific Gravity

In the range from 1.30 to 1.35 dN/dm³, when tested in accordance with test method [ASTM D792](#)

2.1.2.2 Tensile Strength

Not less than 2985 psi when tested in accordance with test method [ASTM D412](#)

2.1.2.3 Modulus of Elasticity

Not less than 2700 psi when tested in accordance with test method [ASTM D412](#)

2.1.2.4 Hardness

Shore "D" between 50 and 60, when tested in accordance with test method [ASTM D2240](#)

2.1.2.5 Brittleness Temperature

Not higher than 15 degrees F, or lower temperature when specified by the purchaser, when tested in accordance with test method [ASTM D746](#).

2.1.2.6 Resistance to Abrasion

The percentage of the weight loss shall be less than 12 percent.

2.1.2.7 Salt Spray Exposure and Ultra Violet Light Exposure

The PVC shall show no effect after 3,000 h of salt spray exposure in accordance with [ASTM B117](#). The PVC shall show no effect of exposure to ultra violet light with test exposure of 3,000 h, using apparatus Spectral Irradiance of Open Flame Carbon Arc with Daylight Filters and 145 degrees F, when tested in accordance with practice [ASTM D1499](#) and [ASTM G152](#)

Evaluation of Coating After Salt Spray and Ultraviolet Exposure Test

After the salt spray test and exposure to ultraviolet light, the PVC coating shall not show cracks nor noticeable change of color, or blisters or splits. In addition, the specific gravity, tensile strength, hardness and resistance to abrasion shall not change more than 6 percent, 25 percent, and 10 percent respectively, from their initial values.

2.1.3 [Alternative Wire Fasteners](#) for Gabions

- a. Subject to approval of the Contracting Officer, alternative fastening systems may be used in lieu of lacing wire. Alternative fasteners to lacing wire recommended for woven wire gabions, according to [ASTM A975](#), are steel ring fasteners for metallic coated gabions. For each shipment of wire gabions delivered to the site, furnish the Contracting Officer, in duplicate, test reports or records that have been performed during the last year on all material contained within the shipment meets the composition, physical, and manufacturing requirements stated in this specification. Ring fasteners for woven wire gabions shall comply with the minimum requirements indicated in paragraph Ring Fasteners below, and they shall develop a minimum panel to panel joint strength as indicated in Table 1. Provide a complete

description of the fastener system and a description of a properly installed fastener, including drawings or photographs if necessary. Provide test results that demonstrate that the alternative-fastening system meets the requirements of the specifications, according to the following criteria:

(1) That the proposed fastener system can consistently produce a panel to panel joint strength as indicated in the Table 1 for double twisted wire mesh gabions;

(2) That the proposed fastener system does not cause damage to the protective coating on the wire;

(3) That the Contractor has the proper equipment and trained employees to correctly install the fasteners;

(4) That proper installation can be readily verified by visual inspection.

- b. Samples of wire fasteners with their certified test records shall be submitted at least 60 days in advance to the Contracting Officer for approval. The Government reserves the right to test additional samples to verify the submitted test records at the Government's expense. When the first test results indicate that the fasteners do not meet the specified requirements, the additional test will be at the Contractor's expense. The fasteners will be rejected after two tests failing to meet the requirements.

2.1.3.1 Ring Fasteners

The tensile strength of the zinc-coated steel wire, zinc-5 percent aluminum coated mischmetal alloy-coated steel wire and aluminum-coated steel wire used for fasteners shall be in accordance with the requirements of [ASTM A764](#), Type A, B, or C, Table 2 or Table 3. The tensile strength of stainless steel wire used for fasteners shall be in accordance with the requirements of [ASTM A313](#), Type 302, Table 2. Any fastener system shall give the number of fasteners required to comply with TABLE 1, in accordance with [ASTM A975](#) (Section 13.1.2) for woven wire gabions. Ring fasteners shall not be installed more than 4 inches apart. Each fastener type shall be closed and the free ends of the fastener shall overlap a minimum of 1 inch. The manufacturer or supplier shall state the number of fasteners required for all vertical and horizontal connections for single and multiple basket joining. Approved ring fasteners including fasteners made of stainless steel shall be subject to the salt spray test and pull-apart resistance test and shall be documented by actual testing of panel to panel connections within the last year by validated laboratories.

2.1.4 Testing

Test records made within one year by certified laboratories and Government agencies will be used to determine the acceptability of the fastening system. Samples of wire fasteners and samples of material for fabricating the gabions and mattresses with their certified test records shall be submitted at least 60 days in advance to the Contracting Officer for approval. The Government reserves the right to test additional samples to verify the submitted test records at the Government's expense. When the first test results indicate that the fasteners do not meet the specified requirements, the additional test will be at the Contractor's expense. The fasteners will be rejected after two tests failing to meet the

requirements.

2.1.4.1 Salt Spray Test

A set of two identical rectangular gabion panels, each with a width about 10-1/2 mesh openings along a selvedge wire, shall be joined by properly installed wire fasteners along the two selvedge wires so that each fastener confines two selvedge and two mesh wires. If the fasteners are also to be used to joint two individual empty gabion baskets, two additional selvedge wires which are each mechanically wrapped with mesh wires shall be included so that each fastener confines four selvedge and four mesh wires. The set of the jointed panels shall be subject to salt spray test, [ASTM B117](#), for a period of not less than 48 hours. At the end of the test, the fasteners, the selvedge, or mesh wires confined by the fasteners shall show no rusty spots on any part of the surface excluding the cut ends. A properly installed fastener shall meet the following requirements:

- a. Each interlocking fastener shall be in a locked and closed position.
- b. Each ring fastener shall be closed, and the free ends of the fastener shall overlap a minimum of [1 inch](#).

2.1.4.2 Pull-Apart Resistance Test

A new set of the jointed panels, which are prepared by the same method as specified in the salt spray test but without being subject to the 48-hour salt spray test, shall be mounted on a loading machine with grips or clamps such that the panels are uniformly secured along the full width. The grips or clamps shall be designed to transmit only tension forces. The load will then be applied at a uniform rate of [50 lbs/sec](#) until failure occurs. The failure is defined as when the maximum load is reached and a drop of strength is observed with subsequent loading or the opening between any two closest selvedge wires, applicable to a fastener confining either two or four selvedge wires, becomes greater than [2 inches](#) at any place along the panel width. The strength of the jointed panels at failure shall have a minimum as indicated in TABLE 2.

2.1.5 Stone Fill

Stone Fill material shall conform to the requirements of Section M.10.03 of the [State Specifications](#). Gradation of the material shall be as specified for R-3 Graded Rip Rap Stone in Section M.10.03.2 of the [State Specifications](#).

2.1.5.1 General

For gabions, the ability to function properly depends upon their stability, which is partly depending upon the rocks filling them. Rock sizes should be chosen to prevent them from falling through the mesh of the gabions. The rock has also to withstand natural weathering processes during the life of the project that would cause it to breakdown to sizes smaller than the wire mesh opening dimensions. Rock to fill gabions shall be durable and of suitable quality to ensure permanence in the structure and climate in which it is to be used.

- a. Delivery. Deliver rock to the work site in a manner to minimize its reduction in sizes (breakdown) during the handling of the rock, and place and secure within the assembled and interconnected gabion.

- b. Sources. The sources from which the Contractor proposes to obtain the material shall be selected well in advance of the time when the material will be required in the work. The inclusion of more than 5 percent by weight of dirt, sand, clay, and rock fines will not be permitted. Rock may be of a natural deposit of the required sizes, or may be crushed rock produced by any suitable method and by the use of any device that yields the required size limits.
- c. Properties. Rocks shall be well-graded, hard, sound, angular to round, durable, free from cracks, and other structural defects that may cause it to deteriorate. Rocks shall not contain any material that easily disintegrates or can be easily cleaved into thin, elongated pieces (such as phyllite, shale, or slate). Rocks shall be of such quality that they shall not disintegrate on exposure to water or weathering during the life of the structure. Soundness shall meet the requirements of the [State Specifications](#), section 304.02.
- d. Non-Listed Source. As an option, propose to furnish stone from one non-listed source. The Government may make such investigations and tests as necessary to determine whether acceptable stone can be produced from the proposed source. Suitable samples of stone fill material shall be collected in the presence of a Government representative and submitted to the Contracting Officer for approval prior to delivery of any such material to the work site. Unless otherwise specified, all test samples shall be obtained and delivered at the Contractor's expense to the Contracting Officer at least 60 days in advance of the time when placing of the stone-filled gabions is expected to begin. Suitable tests and/or service records will be used to determine the acceptability of the stone. In the event suitable test reports and service records are not available, as in the case of newly operated sources, the material may be subjected to petrography analysis, specific gravity, absorption, wetting and drying, freezing and thawing, and such other tests as may be considered necessary to demonstrate to the satisfaction of the Contracting Officer that the materials are acceptable for use in the work. All tests will be made by or under the supervision of the Government and at its expense.

2.1.5.2 Stone Quality

Stone fill, crushed stone, shall meet the quality requirements of [ASTM C33](#), and freezing and thawing requirements of [ASTM D5312](#) for the region of the United States in which the structure will be constructed.

2.1.5.3 Gradation

Gradation of stone for gabions shall be performed every 1000 tons placed under this contract in accordance with [ASTM C136](#). The rock size shall be 2 inches minimum to 8 inches maximum when measured in accordance with [ASTM D5519](#). Sizes of rock to fill gabions are chosen on the basis of the mesh sizes and the structure's thickness. Within each range of sizes, the rock shall be large enough to prevent individual pieces from passing through the mesh openings. Each range of sizes may allow for a variation of 5 percent oversize rock by weight, or 5 percent undersize rock by weight, or both.

- a. Oversize Rock. In all cases, the sizes of any oversize rock shall allow for the placement of three or more layers of rock within each

gabion compartment dependent upon the height of the gabion.

- b. Undersize Rock. In all cases, undersize rock shall be placed within the interior of the gabion or mattress compartment and shall not be placed on the exposed surface of the structure. There shall be a maximum limit of 5 percent undersize or 5 percent oversize rock, or both, within each gabion compartment.

PART 3 EXECUTION

3.1 FOUNDATION PREPARATION

Foundation preparation shall not take place on frozen or snow-covered ground. After excavation or stripping, to the extent indicated on the drawings or as directed by the Contracting Officer, all remaining loose or otherwise unsuitable materials shall be removed. All depressions shall be carefully backfilled to grade with leveling fill. If pervious materials are encountered in the foundation depressions, the areas shall be backfilled with free-draining materials. Any debris that will impede the proper installation and final appearance of the gabion layer shall also be removed. Immediately prior to placing the gabions, the Contracting Officer shall inspect the prepared foundation surface, and no material shall be placed thereon until that area has been approved.

3.2 ASSEMBLY

3.2.1 Double Twisted Wire Mesh Gabions

The gabions shall be opened and unfolded one by one on a flat, hard surface. Gabion units over 6 foot in length usually have an extra shipping fold, which must be removed. The sides, ends and diaphragms shall be lifted up into a vertical position to form an open box shape. The back and the front panels of the gabion shall be connected to the end panels and center diaphragms. The top corner of the end panels and center diaphragms have a selvedge wire extending approximately 4 inches out from the corner edge. The end panels and the diaphragms shall be raised to a vertical position and the selvedge wire shall be wrapped around the edge wire of the top and back panels.

3.3 LACING OPERATIONS

3.3.1 Double Twisted Wire Mesh Gabions

Either lacing wire or ring fasteners are permitted to lace double twisted wire mesh gabions.

3.3.1.1 Lacing Wire

When using lacing wire, a piece of wire 1.2 to 1.5 times the length of the edge to be laced shall be cut off. If the edge of the basket is 3 foot long, no more than 4 to 5 feet of wire should be used at a time to lace. For vertical joints, starting at the bottom end of the panel, the lacing wire shall be twisted and wrapped two times around the bottom selvedge and double and single loops shall be alternated through at intervals not bigger than 4 to 6 inches. The operation shall be finished by looping around the top selvedge wire. The use of pliers to assemble the units with lacing wire is normally recommended.

3.3.1.2 Steel Wire Ring Fasteners

When steel wire ring fasteners are used, the rings shall be installed at the top and bottom connections of the end and center diaphragms. The ring spacing shall be based on the minimum pull apart strength as specified in TABLE 2. In any case, the maximum ring spacing along the edges shall not exceed 6 inches. The use of either a mechanical or a pneumatic fastening tool for steel wire ring fasteners is required. Ring fasteners shall be galvanized, stainless steel or Zn-5 percent aluminum-mischmetal alloy coated.

3.4 INSTALLATION AND FILLING

Gabion baskets will be installed as outlined in the specification and filled with Stone Fill and Flowable Fill. Empty gabion units shall be assembled individually and placed on the approved surface to the lines and grades as shown or as directed, with the sides, ends, and diaphragms erected in such a manner to ensure the correct position of all creases and that the tops of all sides are level. All gabion units shall be properly staggered horizontally and vertically. Finished gabion structures shall have no gaps along the perimeter of the contact surfaces between adjoining units. All adjoining empty gabion units shall be connected along the perimeter of their contact surfaces in order to obtain a monolithic structure. All lacing wire terminals shall be securely fastened. All joining shall be made through selvedge-to-selvedge or selvedge-to-edge wire connection; mesh-to-mesh or selvedge-to-mesh wire connection is prohibited except in the case where baskets are offset or stacked and selvedge-to-mesh or mesh-to-mesh wire connection would be necessary. As a minimum, a fastener shall be installed at each mesh opening at the location where mesh wire meets selvedge or edge wire.

- a. The initial line of basket units shall be placed on the prepared filter layer surface and adjoining empty baskets set to line and grade, and common sides with adjacent units thoroughly laced or fastened. They shall be placed in a manner to remove any kinks from the mesh and to a uniform alignment. The basket units then shall be partially filled to provide anchorage against deformation and displacement during the filling operation. The stone shall be placed in the units as specified in paragraph Stone Fill, subparagraph Gradation.
- b. Flowable Fill shall be placed in alternating layers with Stone Fill as gabion baskets are filled to decrease the voids and permeability of the completed units. Flowable Fill shall be generally placed toward the center of the gabion baskets with Stone Fill on the exterior to ensure a neat, natural appearance in the finished units minimizing exterior visibility of Flowable Fill.
- c. Undue deformation and bulging of the mesh shall be corrected prior to further stone filling. Care shall be taken, when placing the stone by hand or machine, to assure that the coating on gabions will not be damaged. All visible faces shall be filled with some hand placement to ensure a neat and compact appearance and that the void ratio is kept to a minimum.
- d. Gabion Stone Fill shall be consolidated to minimize future rock settlements, while ensuring the gabion weir walls and capstone meet the design elevation. Gabions can be filled by any kind of earth-filling equipment, such as a backhoe, gradall, crane, etc. The

maximum height from which the stones may be dropped into the baskets shall be 3 feet.

3.4.1 Double Twisted Wire Mesh Gabions

After the foundation has been prepared, the pre-assembled gabions shall be placed in their proper location to form the structure. Gabions shall be connected together and aligned before filling the baskets with rock. All connections (panel-to-panel) and basket-to-basket shall be already carried out as described in paragraph ASSEMBLY. Stone fill shall have a gradation of 2 to 8 inches, as described in paragraph Gradation, and shall be placed in 1 foot lifts. Cells shall be filled to a depth not exceeding 1 foot at a time. The fill layer should never be more than 1 foot higher than any adjoining cell. Stiffeners or internal cross ties shall be installed in all front and side of the gabions at 1/3 and 2/3 of the height for 3 feet or higher gabions, as the cell is being filled. Stiffeners shall be installed in the center of the cells. In 1.5 foot high units, stiffeners or internal crossties are not required. Internal cross ties, or alternatively the preformed stiffeners, shall be looped around three twisted wire mesh openings at each basket face and the wire terminals shall be securely twisted to prevent their loosening. The number of voids shall be minimized by using a well-graded stone in order to achieve a dense, compact stone fill. All corners shall be securely connected to the neighboring baskets of the same layer before filling the units. When more than one layer of gabions is required, in order for the individual units to become incorporated into one continuous structure, the next layer of gabions shall be connected to the layer underneath after this layer has been securely closed.

3.4.2 Non-Rectangular Shapes

Gabion units can conform to bends up to a radius of curvature of 60 to 70 feet without alterations. Units shall be securely connected together first, and be placed to the required curvature, holding them in position by staking the units to the ground with hardwood pegs before filling. For other shapes, bevels and miters can be easily formed by cutting and folding the panels to the required angles.

3.5 CLOSING

Lids shall be tightly secured along all edges, ends and diaphragms in the same manner as described for assembling. Adjacent lids may be securely attached simultaneously. The panel edges shall be pulled to be connected using the appropriate closing tools where necessary. Single point leverage tools, such as crowbars, may damage the wire mesh and shall not be used. All end wires shall then be turned in.

-- End of Section --

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DIVISION 35 - WATERWAY AND MARINE CONSTRUCTION

SECTION 35 31 19

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SECTION 35 31 19

ROCK FOR CONSTRUCTION

PART 1 GENERAL

1.1 SUMMARY

The work covered by this section of the specifications consists of providing all supervision, plant, labor, materials, tools and equipment, safety, quality control, and mobilization and demobilization necessary to perform all work required. Work shall be completed as specified herein and as indicated on the contract drawings.

1.2 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.

ASTM INTERNATIONAL (ASTM)

ASTM C127 (2012) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate

ASTM D5312/D5312M (2012; R 2013) Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions

INTERNATIONAL SOCIETY OF ROCK MECHANICS (ISRM)

ISRM Method 3 (2005) Unit Weight, Porosity and Specific Gravity of Rock

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01340 SUBMITTALS AND SUBSTITUTIONS:

SD-01 Preconstruction Submittals

Source of Stone; G

The Contractor shall submit the source(s) for all types of stone and gravel materials proposed for use on the project.

Demonstration Sections; G

SD-04 Samples

Stone Samples; G

The Contractor shall submit samples for all stone types and gravel materials proposed for use on this project.

SD-06 Test Reports

All testing shall be performed by an approved commercial laboratory.

Evaluation Testing of Stone; G

SD-07 Certificates

Qualifications; G

Submit the resumes of the foreman and operators who are to perform the stone handling and setting operations. Submitted resumes shall contain examples of successful completion of similar and comparable work to be accepted.

1.4 MISPLACED MATERIAL

All material that is deposited elsewhere than in places designated or approved by the Contracting Officer will not be paid for, and the Contractor will be required to remove the misplaced material and deposit it where directed at no additional cost to the Government.

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

All work specified in this Section and associated work specified elsewhere in the contract documents shall be performed by individuals who have experience in similar work in term of type and magnitude of this project. The foreman and operator shall have at least 5 years of prior experience for this type of construction and show evidence of successful completion of similar and comparable work.

1.5.2 Stone

1.5.2.1 Quality of Stone

All stone shall be durable material as approved by the Contracting Officer. Stone to be used on the exterior of faces of the gabon baskets shall be of a suitable quality and be Rhode Island Formation to match the appearance and engineering properties of the existing bedrock. The Rhode Island Formation is described to be very hard, massive, unweathered, fine-grained, meta-sandstone.

Stone shall be free from cracks, blast fractures, bedding, seams, fissures, solution cavities or other defects that would tend to increase its deterioration from natural causes. Inspections for cracks, fractures, seams and defects shall be made by visual examination during the stone selection process at the stone source. If, by visual examination, it is determined that 20 percent or more of the stone produced contains hairline cracks, then all stone produced at that source by the means and measures which caused the fractures shall be rejected. A hairline crack that is defined as being detrimental is visible to the naked eye (aperture of approximately 4 mils) and continuous for one-third the dimension of at least two sides of the stone. The stone shall be clean and adequately free

from all foreign matter. Any foreign material adhering to or combined with the stone as a result of stockpiling shall be removed prior to placement..

1.5.2.2 Source of Stone

a. Selection of Source. The Contractor shall submit the source for all stone materials used in the project. The Contractor shall designate in writing only one source or one combination of sources from which stone is proposed to be furnished. It is the Contractor's responsibility to determine that the stone source or combination of sources selected is capable of providing the quality, quantities, gradation, and at the rate needed to maintain the scheduled progress of the work. Samples for acceptance testing shall be provided in accordance with paragraph Evaluation Testing of Stone below. If a source for stone as designated by the Contractor is not accepted for use by the Contracting Officer, the Contractor shall propose other sources.

b. Acceptance of Materials. Acceptance of a source of stone is not to be construed as acceptance of all material from that source. The right is reserved to reject materials from certain localized areas, zones, strata, or channels, within the approved source when, in the opinion of the Contracting Officer, the stone is disintegrated, badly weathered, or otherwise unsatisfactory for use in the work. The Contracting Officer also reserves the right to reject individual units of produced specified materials in stockpiles at the quarry, all transfer points, and at the project construction site when such materials are determined to be unsuitable. Materials produced shall meet all the requirements herein. During the contract period, both prior to and after materials are delivered to the job site, visual inspections and measurements of the stone materials may be performed by the Contracting Officer. If the Contracting Officer, during the inspections, finds that the stone quality, gradation or weights of stone being furnished are not as specified or are questionable, re-sampling and re-testing will be required. Sampling of the delivered stone for testing and the manner in which the testing is to be performed shall be as directed by the Contracting Officer. This additional sampling and testing shall be performed at the Contractor's expense when test results indicate that the materials do not meet specified requirements. If test results indicate that materials meet specified requirements, an equitable adjustment in the contract price will be made for the sampling and testing. Any material rejected on site shall be removed from the site by the Contractor and returned to the quarry named and weighed with a weight slip, and disposed of as specified and at the Contractor's expense.

1.5.2.3 Stone Samples

a. Suitable stone samples shall be submitted for approval to the Contracting Officer prior to delivery of any such material to the worksite. Samples shall be composed of approximately 25 pound pieces of representative rock, one piece for each type of rock and each stone source planned for use.

b. The samples shall be suitably identified by number and quarry name. Submitted samples shall be accompanied by letter, in triplicate, setting forth sample designations, name of quarry, ownership of quarry, location of samples from within the quarry, method of sampling, and, if available, record and method of tests, geologic descriptions, and history of use in marine construction. The Contractor shall provide photographs of the quarried stone stockpile.

c. In the event that the Contractor proposes to furnish stone from an undeveloped source, or a source open by minor quarrying or prospecting, the area proposed for development shall be adequately explored to the satisfaction of the Contracting Officer by means of "NX" (3 inch) size core drilling to the limits and full depths of expected production. The Contractor shall locate the borings by surveys, and the entire footage of recovered cores shall constitute the samples and shall be suitably boxed and marked as to elevations, depths, and core losses. Submittal of core samples shall be accompanied by three copies of a plan showing locations and elevations of borings together with detailed logs of boring operations. Drilling, blasting, and sampling of stripped or naturally exposed areas of the bedrock surface which present prominent faces suitable for trial quarrying may serve as a partial alternative to the core drilling method of exploration and sampling, as approved by the Contracting Officer.

1.5.2.4 Evaluation Testing of Stone

a. The acceptability of the stone shall be determined from existing test reports available from the stone supplier, or by tests performed at the Contractor's expense, and by geologic examination of samples from the quarry. Tests performed shall be at the Contractor's expense for proposed sources of stone which do not have suitable existing test reports, such as newly opened, or long abandoned quarries and undeveloped sources, and for existing tests that are more than 2 years old. Existing test report results, or new tests to which the stone shall be subjected, shall include specific gravity, unit weight, absorption, and freezing and thawing. The tests shall be conducted in accordance with [ASTM C127](#) and [ASTM D5312/D5312M](#), or [ISRM Method 3](#). The Contractor shall submit a copy of the required test reports, which shall be approved by the Contracting Officer prior to delivery of such material to the worksite.

b. Samples of stone for evaluation testing shall be taken by a representative of the Contractor under the supervision of the Contracting Officer for testing and acceptance prior to delivery of any stone from this source to the site of the work. Samples shall consist of at least three pieces of stone, roughly cubical in shape and weighing not more than 25 pounds each from each unit that will be used in the production of the required stone. The Contractor shall confirm the sample quantity and size required by the testing laboratory as their sample requirements may differ from that shown in the specifications. If the source is an undeveloped quarry, or if the operation has been dormant for more than one year such that fresh samples are not available, expose fresh rock for 20 feet horizontally and for the full height of the face proposed for production, prior to the field evaluation. The Contracting Officer may also require documentation of subsurface exploration of an undeveloped quarry in order to determine whether or not sufficient reserves are available. Stone from an existing stockpile may also be used as long as fresh stone samples can be obtained for geotechnical testing. The samples shall be shipped at the Contractor's expense to a local Geotechnical Testing Laboratory for analysis.

c. As noted above, the Contracting Officer will not accept existing test reports that are more than 2 years old.

d. The Contractor shall note that the time duration of evaluation testing of stone for this part of Rhode Island is approximately 25 days (5 weeks), based on the Isoline Map in Figure 1 of [ASTM D5312/D5312M](#). Geotech

testing labs generally do not perform the testing during weekends or holidays. Quarries do not typically have this type of data available.

1.6 CONSTRUCTED SURFACES/TOLERANCES

The finished surface and stone layer thickness shall not deviate from the lines and grades shown by more than the tolerances listed in the relevant subparts of Part 3 of this specification section. Tolerances are measured perpendicular to the indicated neatlines. The intention is that the work shall be built generally to the required elevations, slope and grade as shown on the contract drawings, and with an irregular surface that reflects a rugged, natural texture. Placed material not meeting these requirements shall be removed or reworked as directed by the Contracting Officer.

1.7 DEMONSTRATION SECTIONS

a. The Contractor shall construct Demonstration Sections of the typical weir wall section for approval by the Government. The Demonstration Sections shall be constructed by the Contractor and approved by the Contracting Officer prior to the start of any other work on the weir walls. The Demonstration Sections shall be approximately 10 feet long each and constructed at locations determined by the Contractor and approved by the Contracting Officer. The Demonstration Sections shall include the mortared leveling fill base, gabion weir walls, and capstone. Demonstration sections are also required for the ledge spine. The Demonstration Sections shall meet the design requirements within acceptable tolerances and be done safely. The Contractor shall submit as-built cross-sections of the completed Demonstration Sections in CAD format (dwg or dgn), prior to written request for inspection of the completed Demonstration Sections by the Contracting Officer.

b. Deficiencies noted in the inspection shall be corrected by the Contractor until successful sections has been completed, reinspected, and accepted, at no additional cost to the Government. Additional time will not be granted for any reconstruction work required to correct deficiencies. The successful Demonstration Sections shall become part of the finished weir. The Contracting Officer shall be the sole judge as to the acceptability of the Demonstration Sections. After acceptance of the Demonstration Sections by the Contracting Officer, construction may proceed on the remaining work on the weirs using the Demonstration Sections as a baseline.

PART 2 PRODUCTS

2.1 CAPSTONE

2.1.1 Weight of Stone

The stones furnished for top surface of gabion baskets shall weigh between 300 and 600 lbs each, and shall be free of fines and any attached debris. Stone shall have a density of at least 162 pounds per cubic foot.

2.1.2 Dimension Limitations of Stone

a. Weir Captstone: Stones shall measure 3' in width, to match the width of weirs. Width is defined as the upstream to downstream dimension of the structure. The stones may be roughly rectangular, however, they shall maintain an angular and irregular shape to immitate natural rock found in

the stream channel. To achieve this irregularity, the stone may vary in height from 4 to 6".

b. Ledge Spine Capstone: Stone shall have minimum dimensions of 1.5' x 2.5' x 0.5' to achieve the minimum weight of 300 lbs per stone. the 1.5' dimension represents the thickness of the ledge spine wall. The stones may be roughly rectangular, however, they shall maintain an angular and irregular shape to immitate natural rock found in the stream channel.

PART 3 EXECUTION

3.1 GENERAL

The Contractor is responsible for controlling water entering the work area so that operations can be maintained and previous work will not be impacted. The Contractor shall sequence the work to minimize disruption or damage to the completed work prior to project completion.

3.2 BASE PREPARATION

a. Weir Capstone: Stone is to be placed on assembled gabion walls in accordance with Section 31 36 01 Wire Mesh Gabions. The gabion walls shall conform to the cross sections shown on the contract drawings with an allowable tolerance of plus or minus 3" inches from the theoretical slope lines and grades. The prepared base shall be approved by the Contracting Officer. Prior to placement of stone, mortar may be required to fill irregularities along the top of the gabion baskets.

b. Ledge Spine Capstone: Prior to placement of stone, leveling fill may be required to fill irregularities along the existing ledge and create a suitable base for capstone placement. This prepared base shall be approved by the Contracting Officer.

3.3 PLACEMENT OF STONE

3.3.1 General

Stone shall be placed as specified below and within the limits shown on the contract drawings. The stone shall be placed carefully with equipment suitable for handling the stone of the specified size.

3.3.2 Placement and Interlock

a. Stone shall be placed in a manner which will produce a well-graded mass of rock with the minimum practicable percentage of voids to minimize weir permeability, and shall be constructed to the lines and grades shown on the contract drawings.

b. Stones shall be selected and keyed in, meaning that stones are set in contact with each other so that the interstices between adjacent stones shall be as small as the character of the stone will permit. Mortar shall be used to affix the stones to the prepared base, conforming to the requirements of 04 20 00 UNIT MASONRY. Each stone shall not rock in place. The face of stone having the largest area shall be placed against the surface of the underlying material.

c. The tolerance of plus 2 inch and minus 2 inch from the slope lines and grades shown on the contract drawings will be allowed in the finished surface. The average tolerance of the entire job shall have no more than

50 percent of the tolerances specified above.

D. Maintain the stone protection until accepted by the Contracting Officer; any material displaced prior to acceptance shall be replaced by the Contractor with no additional payment by the Government and to the lines and grades shown on the contract drawings.

3.4 TESTS AND INSPECTIONS

3.4.1 Placement Control

3.4.1.1 Quality Control Measures

Establish and maintain quality control for all work performed at the job site under this section to assure compliance with contract requirements. Maintain records of the quality control tests, inspections and corrective actions. Quality control measures shall cover all construction operations including, but not limited to, the placement of all materials to the slope and grade lines shown and in accordance with this section.

-- End of Section --