

PARE PROJECT NUMBER 18200.00

CONTRACT DOCUMENTS
FOR
CAMP FOGARTY CULVERT REPLACEMENT
RHODE ISLAND ARMY NATIONAL GUARD
EAST GREENWICH, RHODE ISLAND

PREPARED FOR:

Rhode Island Army National Guard
Construction and Facilities Management Office
645 New London Avenue
Cranston, RI 02920

PREPARED BY:

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LINCOLN, RI 02865

MAY 16, 2019

**RHODE ISLAND ARMY NATIONAL GUARD
CAMP FOGARTY CULVERT REPLACEMENT
STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS**

INVITATION TO BID

The Project includes the construction of a new culvert and headwall on the Rhode Island Army National Guard – Camp Fogarty Property and regrading of the existing gravel roadway, including all incidentals to complete the work as described within the contract documents.

**CONTRACTORS SHALL REFERENCE INVITATION TO BID ISSUED BY THE
DEPARTMENT OF ADMINISTRATION DIVISION OF PURCHASING FOR:**

- **PRE-BID MEETING DATE/TIME**
- **BID, PAYMENT, AND PERFORMANCE BOND REQUIREMENTS**
- **INFORMATION FOR QUESTIONS, AND DEADLINE.**
- **INSURANCE REQUIREMENTS**
- **WAGE REQUIREMENTS**
- **EQUAL OPPORTUNITY REQUIREMENTS**
- **LIQUIDATED DAMAGES**

All proposals are subject to the provisions of Chapter 13 of Title 37 of the RI General Laws as amended, including but not limited to, those provisions relative to prevailing wages as applicable.

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Division 00 – Bidding and Contract Requirements

DOCUMENT
DRAWING LIST

LIST OF DRAWINGS

COVER SHEET

C1.1 NOTES & LEGEND C2.0

C2.0 GENERAL PLAN

C3.0 DETAILS 1

EXISTING CONDITIONS

END OF DOCUMENT

Solicitation #: _____

Solicitation Title: _____

BID FORM

To: The Department of Administration, Division of Purchases
One Capitol Hill, Providence, RI 02908

Project: Camp Fogarty Culvert Replacement
Rhode Island Army National guard
East Greenwich, Rhode Island

Bidder:

Legal name of entity

Address

Contact name Contact email

Contact telephone Contact fax

1. BASE BID PRICE

The Bidder submits this bid proposal to perform all of the work (including labor and materials) as described in the solicitation for this Base Bid Price, (including the costs for all Allowances, Bonds, and Addenda):

\$

(Base Bid Price *in figures* printed electronically, typed, or handwritten legibly in ink)

Solicitation #: _____

Solicitation Title: _____

(Base Bid Price *in words* electronically, typed, or handwritten legibly in ink)

- **ALLOWANCES** (*Not Included*)

- **BONDS**

The Base Bid Price ***includes*** the costs for all Bid and Payment and Performance Bonds required by the solicitation.

- **ADDENDA**

The Bidder has examined the entire solicitation (including the following Addenda), and the Base Bid Price ***includes*** the costs of any modifications required by the Addenda.

All Addenda must be acknowledged.

Addendum No. _____, dated _____

2. ALTERNATES (*Not Included*)

3. UNIT PRICES (*Not Included*)

4. CONTRACT TIME

The Bidder offers to perform the work in accordance with the timeline specified below:

Solicitation #: _____

Solicitation Title: _____

- Start of Submittals.....10 calendar days after receipt of PO
- Work within the Watercourse.....Not Prior to July 1, 2019
(Allowable closure of roadway – 45 Days from start of Construction)
- Substantial CompletionOctober 31, 2019
- Final CompletionNovember 15, 2019

5. LIQUIDATED DAMAGES

The successful bidder awarded a contract pursuant to this solicitation shall be liable for and pay the State, as liquidated damages and not as a penalty, the following amount for ***each*** calendar day of delay beyond the date for substantial completion, as determined in the sole discretion of the State:

One Thousand Dollars (\$1,000) per day.

Solicitation #: _____

Solicitation Title: _____

BID FORM SIGNATURE(S)

This bid proposal is irrevocable for 60 days from the bid proposal submission deadline.

If the Bidder is determined to be the successful bidder pursuant to this solicitation, the bidder will promptly: (i) comply with each of the requirements of the Tentative Letter of Award; and (ii) commence and diligently pursue the work upon issuance and receipt of the purchase order from the State and authorization from the user agency.

The person signing below certifies that he or she has been duly authorized to execute and submit this bid proposal on behalf of the Bidder.

Date: _____

BIDDER

Name of Bidder

Signature in ink

Printed name and title of person signing on behalf of Bidder

Bidder's Contractor Registration Number

Division 01 – General Requirements

SECTION 01 10 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of the Contract, and Division-1 Specification Sections apply to the work of this Section.

1.2 PROJECT IDENTIFICATION

- A. General: Project name is the Camp Fogarty Culvert Replacement
- B. Contract Documents: The work to be performed under this Contract is shown in the Contract Documents prepared by Pare Corporation.

1.3 SUMMARY OF WORK

- A. The work required by these specifications shall include furnishing all labor, skill, supervision, tools, construction plant, equipment and materials, and performing all operations necessary to properly complete contract work as shown on the Drawings, as mentioned in these specifications, and as evidently required, to the complete satisfaction of the Owner and the Engineer.
- B. The work, in general, consists of the following:
 - 1. Installation of erosion and sediment control devices and control of water.
 - 2. Installation of cofferdam system and dewatering operations.
 - 3. Removal and proper disposal of existing concrete headwall and corrugated metal pipe culvert.
 - 4. Installation of reinforced concrete headwall.
 - 5. Installation of 21-Inch High Density Polyethylene Pipe Culvert.
 - 6. Installation of gravel material and re-grading per the contract documents.
 - 7. Replacement of damage chain link fence.
 - 8. Seeding and restoration of all disturbed areas.
- C. The work is located at the Camp Fogarty facility in East Greenwich, Rhode Island. A locus map is attached within the Appendix for reference.
- D. The Contractor shall coordinate and adhere to all of the Owner's access requirements.
- E. The site may be temporarily closed during the construction period. The Contractor will be responsible to work with the Owner to provide access to the site throughout the construction period. The Contractor is required to schedule work in accordance with Owner requirements to ensure critical site operations continue during construction.
- F. The Contractor shall provide all work incidental to and required for a complete and proper installation of the specified and intended work of the Project.
- G. During construction, inspections will be ongoing and the Contractor shall accommodate the Owner's representatives as necessary.

- H. The Contractor is responsible to organize the work of all manufacturers and trades involved in the project.
- I. Coordinate all work with the Owner and maintain the site in a clean, orderly condition during and upon completion of work.
- J. In cases where the Specifications and Drawings include the provision for particular work, equipment or systems as part of the Contract, but do not completely specify all work incidental to such a provision, or do not provide complete detailed designs for all parts of the provision, then the Contractor will provide or perform such incidental work or necessary design services using generally accepted standards of engineering, material, and construction. All Contractor designs shall be approved in writing by the Engineer prior to proceeding with the work. Where required by the Drawings and Specifications, the Contractor shall provide drawings and calculations stamped and signed by a Professional Engineer registered in the State of Rhode Island of the appropriate discipline.
- K. Layout of all work to the lines and grades indicated on the plans is the sole responsibility of the Contractor. Where required a Professional Land Surveyor shall be employed by the Contractor to provide layout of the proposed work.
- L. All electrical and mechanical work shall be completed by Rhode Island Licensed Contractors of the appropriate discipline.
- M. The Contractor may be required by the Owner to meet a Disadvantaged Business Enterprise (DBE) requirement for this project. The Contractor shall include DBE Contractors registered with the State of Rhode Island. The Contractor shall explain how this requirement will be met with the Bid.

1.4 PERMITS

- A. Work shall not commence on any phase of the work requiring a permit until the permit is obtained. The Contractor is required to apply for all permits and pay all fees associated with the proposed work including, but not limited to, government permits and fees, licenses, and utility company charges and fees.
- B. All Work shall be performed in accordance with the Rhode Island Department of Environmental Management (RIDEM) Insignificant Alteration Permit issued for the project. Permit is included within the Appendix.
- C. The Contractor shall become familiar with the requirements of RIPDES and adhere to them in full.
- D. Any fines or penalties resulting from failure to adhere to the requirements of permitting authorities shall be paid for by the Contractor at no additional cost to the Owner.

1.5 GENERAL RESPONSIBILITIES OF THE CONTRACTOR

- A. The Contractor shall be responsible for all personnel involved in the work including those of his direct employ, his subcontractors and suppliers of materials and equipment and/or labor. All coordination between these parties is the responsibility of the Contractor, not the Owner or Engineer.
- B. The Contractor shall be responsible to provide all labor materials, equipment, tools, machinery and construction equipment to complete the work defined in the Drawings and Specifications.

- C. Water, electricity, and other utilities required to complete the Work shall be provided by the Contractor at his expense.
- D. The Contractor is responsible for additional costs incurred during inclement weather and winter months. The Contractor is aware of the time period of the construction project and typical weather within the region. The Owner will not be responsible for additional costs incurred by inclement weather or seasonal conditions.
- E. Any items on-site that are damaged shall be repaired by the Contractor to meet or exceed existing conditions at his own expense.
- F. The Contractor is required to maintain a secure perimeter at the end of every work day throughout the construction period.
- G. The Contractor is required to provide all temporary facilities, temporary controls, erosion and sedimentation control, and other temporary requirements required to complete the Work at no additional cost to the Owner. This includes temporary facilities to provide a secure perimeter around the site meeting the existing conditions throughout the construction period.
- H. Where rock, unsuitable soils, or other unforeseen soil conditions are uncovered, the Contractor shall immediately notify the Owner and Engineer and proceed in accordance with Specification Section 31 00 00 Earthwork.
- I. Where specified, the Contractor is responsible to retain a Professional Engineer registered in the State of Rhode Island to provide engineering design services. Design Drawings and Calculations prepared, stamped, and signed by the Contractor's Engineer shall be provided to the Owner and Engineer for review. Costs for these design services are the responsibility of the Contractor and shall not result in additional expense to the Owner. Costs to revise designs not meeting the specifications, design intent, building codes, electrical codes, or plumbing codes shall be the responsibility of the Contractor.
- J. The Contractor is responsible to apply for all permits for construction of the work including payment of fees, preparation of permit materials and supporting information, and coordination with the applicable Town Departments.
- K. Contractor shall be responsible for providing copies of the latest construction documents, including drawings and specifications, to all the Contractor's personnel including, but not limited to subcontractors, manufacturers, and installers.
- L. The Contractor is responsible to prepare the work in accordance with all local, State, and Federal Laws, applicable building codes, electrical codes, fire protection codes, and plumbing codes.
- M. The Contractor is required to complete work in accordance with the project schedule provided by the Owner and as discussed in specifications Section 01 32 00. Liquidated damages or other conditions may be required from the Contractor in the event that the benchmarks identified in the schedule by the Contract Documents and the Owner has not been met.
- N. Prior to substantial project completion, the Contractor shall provide Record Documents to the Owner in accordance with Section 01 78 39.
- O. The Contractor is solely responsible for job-site safety and shall review all work completed on-site to ensure that work is completed in accordance with all applicable OSHA and local safety standards.

Pare Corporation

Camp Fogarty Culvert Replacement
18200.00

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 10 02

ABBREVIATIONS, SYMBOLS, AND DEFINITIONS

PART 1 - GENERAL

1.1 STANDARD SPECIFICATIONS

- A. Wherever a reference is made to any standard specifications, it shall mean the most recent specification, code, standard or tentative specification of the organization referred to, and these standard specifications shall be considered a part of these Contract Documents to the extent indicated. Abbreviations which may be used refer to the following organizations:

| | | |
|-----|--------|---|
| 1. | AA | Aluminum Association |
| 2. | AAMA | Architectural Aluminum Manufacturers Association |
| 3. | AASHTO | American Association of State Highway and Transportation Officials |
| 4. | ACI | American Concrete Institute |
| 5. | AISC | American Institute of Steel Construction |
| 6. | AISI | American Iron and Steel Institute |
| 7. | ANSI | American National Standards Institute |
| 8. | ASTM | American Society for Testing and Materials |
| 9. | AWS | American Welding Society |
| 10. | CRMC | Costal Resource Management Council |
| 11. | NFPA | National Fire Protection Association |
| 12. | OSHA | Occupational Safety and Health Administration |
| 13. | PTI | Post-tensioning Institute |
| 14. | RIDEM | Rhode Island Department of Environmental Management |
| 15. | RIDOT | Rhode Island Department of Transportation |
| 16. | UL | Underwriter's Laboratory |

1.2 DEFINITIONS

- A. General: A substantial amount of specification language consists of definitions of terms found in other Contract Documents, including the drawings. Certain terms used in Contract Documents are defined in this article. Definitions and explanations contained in this section are not necessarily either complete or exclusive, but are general for the work to the extent that they are not stated more explicitly in another element of the Contract Documents.
- B. Owner: The State of Rhode Island is the current owner of the property. The Rhode Island National Guard is the administrator of the Contract. Owner as identified in the Contract Documents shall mean the State of Rhode Island or the Rhode Island National Guard.
- C. Engineer: Refers to the engineer of record, PARE CORPORATION of Lincoln, Rhode Island and its representatives.
- D. Regulatory Agencies: Refers to the following agencies having jurisdiction over all or part of the work:
1. Rhode Island Department of Transportation
 2. Rhode Island Department of Environmental Management

3. Town of East Greenwich Building Department

- E. Work: Refers to all construction activities associated with the Camp Fogarty Culvert Replacement as specified in the Contract Documents and specified herein.
- F. Contractor: General Contractor obligated to complete the work under contract with the Owner. Contractor includes all personnel, subcontractors, manufacturers, suppliers or others employed by the General Contractor to complete the work.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 10 10

CONTRACT CONSIDERATIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Inspection and testing
- B. Layout
- C. Schedule of work
- D. Application for Payment
- E. Change Procedures

1.2 RELATED SECTIONS

- A. Owner-Contractor Agreement: Contract sum/price including allowances. Bonds and Insurance Requirements.
- B. Document 01 77 00 - Contract Close Out.

1.3 INSPECTION AND TESTING

- A. The Contractor shall be responsible for engaging a testing firm, execution of tests, and reporting results in accordance with these specifications. Coordination with the testing firm is the responsibility of the Contractor. Testing costs shall be at the Contractor's expense. Additional costs to retest failed materials shall be at the sole expense of the Contractor.
- B. The Contractor will cooperate with the Owner and provide his agents with the facilities necessary to sample and inspect during each phase of construction at no cost to the Owner. The Contractor shall be responsible for all costs associated with retesting areas that have previously failed.

1.4 LAYOUT

- A. The Contractor is responsible for layout of the proposed improvements to the lines and grades depicted on the Drawings. Contractor shall hire a Professional Land Surveyor Registered in the State of Rhode Island to perform all layout services.
- B. The Contractor's land surveyor shall:
 - 1. Identify existing control points on the project site. Surveyor shall make all measurements required to establish control on the project site.
 - 2. Verify layout information depicted on the Drawings and their relation to existing field conditions prior to commencing layout of the work.
 - 3. Establish and maintain a minimum of two permanent benchmarks on the site referenced to the datum established by the control points.

- C. Reference points and benchmarks shall be protected by the Contractor at all times. Damaged reference points and benchmarks shall be replaced by the Contractor at no additional expense to the Owner.

1.5 SCHEDULE OF WORK

- A. There shall be a Preconstruction Conference before commencing work with the Owner, Engineer, and Contractor.
- B. The Contractor shall provide a detailed schedule in accordance with Section 01 32 00 Construction Schedules.

1.6 APPLICATIONS FOR PAYMENT

- A. Submit three copies of each application for payment on the form specified by the Owner.
- B. For each item, provide a column for listing: Item Number; Description of Work; Scheduled Value, Previous Applications; Work in Place and Stored Materials under this Application; Authorized Change Orders; Total Completed and Stored to Date of Applications; Percentage of Completion; Balance to Finish; and Retainage.
- C. Present required information in typewritten form.
- D. Execute certification by signature of authorized officer.
- E. Use data from approved values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.
- F. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of work.
- G. Prepare Application for Final Payment as specified in Section 01 77 00 - Contract Closeout.
- H. Contractor shall provide Certified Payroll indicating that all Contractors and Subcontractors are compensated in conformance with the Davis-Bacon Act and Prevailing Wage Law.

1.7 CHANGE PROCEDURES

- A. The Owner will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by the Owner, by issuing written supplemental instructions.
- B. The Owner may issue a Notice of Change, which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within 5 business days.
- C. The Contractor may propose a change by submitting request for change to the Owner, describing the proposed change and its full effect on the work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation and a statement describing the effect on work by separate or other contractors. Document any requested substitutions. No change will be allowed except under written approval and Notice of Change of the Owner. Verbal orders are not binding.

- D. Stipulated Sum/Price Change Order: Based on Notice of Change and Contractor's estimated price quotation.
- E. Unit Price Change Order: For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under a Work Directive Change. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.
- F. Work Directive Change: The Owner may issue a signed directive, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute the change.
- G. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. The Owner shall determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.
- H. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the work.
- I. Change Order Forms: Use form issued by the Owner.
- J. Execution of Change Orders: The Owner will issue Change Orders for signature of parties as provided in the Conditions of the Contract.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 31 00

PROJECT MEETINGS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. The Owner shall schedule and administer the preconstruction conference. The Owner shall:
1. Prepare the agenda for the meeting.
 2. Notify all parties required to attend meeting.
 3. Make physical arrangements for meeting.
 4. Preside at meeting.
 5. Record the minutes, including significant proceedings and decisions.
 6. Reproduce and distribute copies of minutes within seven (7) calendar days after the meeting to participants in the meeting and other parties affected by decisions made at the meeting.
- B. The Owner shall schedule and administer periodic progress meetings, and specially called meetings throughout the progress of the work. The Owner shall:
1. Prepare agenda for meetings.
 2. Make physical arrangements for meetings.
 3. Preside at meetings.
 4. Record the minutes, including significant proceedings and decisions.
 5. Reproduce and distribute copies of minutes within seven (7) calendar days after each meeting to participants in the meeting and other parties affected by decisions made at the meeting.
- C. Representatives of Contractors, Subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

1.2 PRE-CONSTRUCTION CONFERENCE

- A. Attendance:
1. Owner.
 2. Engineer and/or representative.
 3. Contractor's superintendent.
 4. Major Subcontractors.
 5. Major suppliers.
 6. Others as appropriate.
- B. Suggested Agenda:
1. Distribution and discussion of
 - a. List of major Subcontractors and suppliers.
 - b. Projected construction schedules.
 2. Critical work sequencing.
 3. Project schedule.
 4. Major equipment deliveries and priorities.
 5. Project coordination.
 - a. Designation of responsible personnel.

6. Procedures and processing of:
 - a. Field decisions.
 - b. Proposal requests.
 - c. Submittals.
 - d. Change orders.
 - e. Applications for payment.
7. Adequacy of distribution of Contract Documents.
8. Procedures for maintaining record documents.
9. Use of premises:
 - a. Office, work and storage areas.
 - b. Owner's requirements.
10. Construction facilities, controls and construction aids.
11. Safety and first-aid procedures.
12. Security procedures.
13. Housekeeping procedures.
14. Place, date and time for regular progress meetings.

1.3 PROGRESS MEETINGS

- A. Conduct regular scheduled progress meetings at place, dates and times agreed upon at Pre-Construction Conference.
- B. Conduct additional meetings as progress of the work dictates. Owner shall organize progress meetings, prepare agenda, and prepare meeting minutes.
- C. Attendance:
 1. Engineer and his professional consultants as needed.
 2. Owner or representative, when required.
 3. Contractor's superintendent.
 4. Subcontractors as appropriate to the agenda.
 5. Suppliers as appropriate to the agenda.
 6. Others.
- D. Suggested Agenda:
 1. Review approval of minutes of previous meeting.
 2. Review of work progress since previous meeting.
 3. Field observations, problems, and conflicts.
 4. Problems which impede construction schedule.
 5. Review of off-site fabrication, delivery schedules.
 6. Corrective measures and procedures to regain projected schedule.
 7. Revisions to construction schedule.
 8. Progress schedule during succeeding work period.
 9. Maintenance of quality standards.
 10. Pending changes and substitutions.
 11. Coordination of schedules.
 12. Review submittal schedules; expedite as required.
 13. Review proposed changes for:
 - a. Effect on construction schedule and on completion date.
 - b. Effect on subcontracts of the project.
 14. Other business.

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18200.00

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

ISSUED FOR BID

PROJECT MEETINGS
01 31 00 - 3

SECTION 01 32 00

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. At least five (5) calendar days before the scheduled Pre-Construction Conference, prepare and submit to the Owner the initial construction schedule for the work, with subschedules, if required, of related activities, which are essential to its progress.
- B. Submit revised progress schedules with the submission of each payment request.
- C. Work at night, on Sundays or major holidays will not be permitted without the Owner's written permission except in case of emergency. If night work is required, the Contractor shall provide, at his own expense, all lighting, safety and other facilities required to properly execute the Work.
- D. The Contractor is made aware that the project site is adjacent to residential properties. Contractor shall complete work within the hours allowed by the Town of East Greenwich Ordinance.
- E. Should any activity not be completed within 14 days of the stated scheduled date, the Contractor shall provide the Owner with a revised schedule and plan depicting details on how the work will be completed to comply with the original schedule completion date. The Contractor is responsible to provide adjustments to this schedule adjustment for all instances during the project at no additional cost to the Owner.
- F. The Owner will not be responsible for additional costs incurred by the Contractor for expediting completion of any work including work that is completed beyond the scheduled completion date.

1.2 FORM OF SCHEDULES

- A. Prepare schedules using Microsoft Project or Primavera Project Planner in the form of a horizontal bar chart.
- B. Provide a separate horizontal bar for each item of work.
- C. Horizontal Time Scale: Identify the first workday of each week.
- D. Scale and Spacing: To allow space for notations and future revisions.
- E. Minimum Sheet Size: 8-1/2" by 11".

1.3 CONTENT OF SCHEDULES

- A. Construction Progress Schedule: Include the following:
 - 1. The name of the project and name and address of the Contractor.
 - 2. The name and address of the Owner.
 - 3. Date indicating the end of the construction period being reported.
 - 4. Legend showing a solid line representing estimated construction and a dotted line representing actual construction.
 - 5. Columns showing the percentage of the total contract of each item, the percentage of completion to date of each item and the weighted percentage of completion of each item to the project as a whole.
 - 6. Starting and completion dates of the contract.
 - 7. Projected percentage of completion for each item, as of the first day of each month.
- B. Submittals Schedule for Shop Drawings, Product Data and Samples: Show the following:
 - 1. The dates for Contractor's submittals.
 - 2. The dates reviewed submittals will be required from the Engineer.

1.4 MONTHLY PROGRESS REPORTS

- A. Indicate progress of each activity to date of submission.
- B. Show changes occurring since previous submission of schedule:
 - 1. Major changes in scope.
 - 2. Activities modified since previous submission.
 - 3. Revised projections of progress and completion.
 - 4. Other identifiable changes.
- C. Provide a narrative report as needed to define:
 - 1. Problem areas, anticipated delays, and the impact on the schedule.
 - 2. Corrective action recommended, and its effect.
 - 3. The effect of changes on schedules of other prime Contractors.

1.5 SUBMISSIONS

- A. Submit initial schedule at least five (5) calendar days before the scheduled Pre-Construction Conference.
 - 1. Owner will review schedule prior to the scheduled Pre-Construction Conference.
 - 2. If required, resubmit within five (5) calendar days after return of review copy.
- B. Submit revised progress schedules every two weeks and with each application for payment.
- C. Submit the number of reproductions which the Owner requires, plus three (3) copies.

1.6 DISTRIBUTION

- A. Distribute copies of the reviewed schedules to:
 - 1. Job site file.
 - 2. Subcontractors.
 - 3. Other concerned parties.

- B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedules.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 Not Used

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, and Division-1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF REQUIREMENTS

- A. General: This section specifies procedural requirements for non-administrative submittals including shop drawings, product data, samples and other miscellaneous work-related submittals. Shop drawings, product data, samples and other work-related submittals are required to amplify, expand and coordinate the information contained in the Contract Documents.
 - 1. Refer to other Division-1 sections and other Contract Documents for specifications on administrative, non-work-related submittals. Such submittals include, but are not limited to the following items:
 - a. Permits.
 - b. Written consents.
 - c. Manifests
 - d. Payment applications.
 - e. Performance and payment bonds.
 - f. Insurance certificates.
 - g. Inspection and test reports.
 - h. Progress reports.
 - i. Listing of Subcontractors.
 - j. Construction schedules.
- B. Shop drawings are technical drawings and data that have been specially prepared for this project, including but not limited to the following items:
 - 1. Control of Water/Dewatering Plan designed and stamped by a Rhode Island Registered Professional Engineer.
 - 2. Concrete Headwall Reinforcing Drawings
 - 3. Concrete Mix Design
 - 4. HDPE Pipe
 - 5. Grain Size Distribution for Gravel
 - 6. Grain Size Distribution for Pipe Bedding Materials
 - 7. Rip Rap Material Information
 - 8. Fabrication and installation drawings.
 - 9. Coordination drawings (for use on-site).
 - 10. Schedules.
- C. Product data includes standard printed information on manufactured products that has not been specially-prepared for this project, including but not limited to the following items:
 - 1. Manufacturer's product specifications and installation instructions.
 - 2. Catalog cuts.

- D. Samples are physical examples of work, including but not limited to the following items:
 - 1. Partial sections of manufactured or fabricated work.
 - 2. Small cuts or containers of materials.
 - 3. Complete units of repetitively-used materials.

- E. Miscellaneous submittals are work-related, non-administrative submittals that do not fit in the three previous categories, including, but not limited to the following:
 - 1. Specially-prepared and standard printed warranties.
 - 2. Project photographs.
 - 3. Testing and certification reports.
 - 4. Record drawings.
 - 5. Field measurement data.
 - 6. Keys and other security protection devices.

1.3 SUBMITTAL PROCEDURES

- A. General: Refer to the General Conditions for basic procedures for submittal handling.

- B. Coordination: Coordinate the preparation and processing of submittals with the performance of the work. Coordinate each separate submittal with other submittals and related activities such as testing, purchasing, fabrication, delivery and similar activities that require sequential activity.
 - 1. Coordinate the submittal of different units of interrelated work so that one submittal will not be delayed by the Engineer's need to review a related submittal. The Engineer reserves the right to withhold action on any submittal requiring coordination with other submittals until related submittals are forthcoming.

- C. Scheduling: In each appropriate administrative submittal, such as the progress schedule, show the principal work-related submittals and time requirements for coordination of submittal activity with related work.

- D. Coordination of Submittal Times: Prepare and transmit each submittal to the Engineer sufficiently in advance of the scheduled performance of related work and other applicable activities. Transmit different kinds of submittals for the same unit of work so that processing will not be delayed by the Engineer's need to review submittals concurrently for coordination.

- E. Review Time: Allow sufficient time so that the installation will not be delayed as a result of the time required to properly process submittals, including time for resubmittal, if necessary. Advise the Engineer on each submittal, as to whether processing time is critical to the progress of the work, and if the work would be expedited if processing time could be shortened.
 - 1. Allow ten (10) calendar days for the Engineer's initial processing of each submittal. Allow a longer time period where processing must be delayed for coordination with subsequent submittals. The Engineer will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination.
 - 2. Allow five (5) calendar days for reprocessing each submittal.
 - 3. No extension of time will be authorized because of the Contractor's failure to transmit submittals to the Engineer sufficiently in advance of the work.

- F. Submittal Preparation: Mark each submittal with a permanent label for identification. Provide the following information on the label for proper processing and recording of action taken.
 - 1. Project name.
 - 2. Date.
 - 3. Name and address of Owner.

4. Name and address of Contractor.
 5. Name and address of supplier.
 6. Name of manufacturer.
 7. Number and title of appropriate specification section.
 8. Drawing number and detail references, as appropriate.
 9. Similar definitive information as necessary.
 10. Provide a space on the label for the Contractor's review and approval markings, and a space for the Engineer's "Action" marking.
- G. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit four (4) copies, plus the number of additional copies the Contractor wants returned to him, after review of each submittal from the Contractor to the Engineer, and to other destinations as required, by use of a transmittal form. Prepare a separate transmittal form for each division of work and identify each submittal by continuous numbering and by specification section number on the transmittal form. Submittals received from sources other than the Contractor will be returned to the sender "without action".
1. Record relevant information and requests for data on the transmittal form. On the transmittal form, or on a separate sheet attached to the form, record deviations from the requirements of the Contract Documents, if any, including minor variations and limitations.
 2. No submittals will be accepted by the Engineer if transmitted via FAX machine.
 3. Include the Contractor's signed certification stating that information submitted complies with requirements of the Contract Documents.
 4. Sequentially number the transmittal forms; resubmittals to have original number with an alphabetic suffix.
- H. Contractor Review: Stamp of approval indicates to Owner and Engineer that all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data have been determined and verified, and that each submittal has been reviewed or coordinated with requirements of work and Contract Documents.
- I. No portion of Work requiring shop drawings shall be started or any materials be fabricated, delivered to site, or installed prior to approval of such items. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved shop drawings and data shall be at Contractor's risk. Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.
- J. Project work, materials, fabrications, and installation shall conform to approved shop drawings.
- K. Submittals not required by the drawings and specifications will not be reviewed by the Owner's Representatives.
- L. Contractor is required to maintain a file of shop drawings and all related correspondence on the job-site for reference during construction.
- 1.4 SPECIFIC SUBMITTAL REQUIREMENTS
- A. Miscellaneous Submittals:
1. Inspection and Test Reports: Classify each inspection and test report as being either "shop drawings" or "product data" depending on whether the report is specially prepared for the project, or a standard publication of workmanship control testing at the point of production. Process inspection and test reports accordingly.
 2. Survey Data: Provide copies of all survey data collected for property surveys, field measurements, quantitative records of actual work, damage surveys and similar data

required by the individual sections of these specifications. None of the specified copies will be returned.

3. Standards: Where submittal of a copy of standards is indicated, and except where copies of standards are specified as an integral part of a "Product Data" submittal, submit a single copy of standards for the Engineer's use. Where workmanship, whether at the project site or elsewhere, is governed by a standard, furnish additional copies of the standard to installers, Owner's field representative, and others involved in the performance of the work.
4. Closeout Submittals: Refer to section "Project Closeout" and to individual sections of these specifications for specific submittal requirements of project closeout information, materials, tools, and similar items.
5. Record Documents: Furnish set of original documents as maintained on the project site.
6. General Distribution: Provide additional distribution of submittals to Subcontractors, suppliers, fabricators, installers, governing authorities and others as necessary for the proper performance of the work. Include such additional copies of submittals in the transmittal to the Engineer where the submittals are required to receive "Action" marking before final distribution. Record distributions on transmittal forms.

1.5 ENGINEER'S ACTION

- A. General: Except for submittals for the record and similar purposes, where action and return on submittals is required or requested, the Engineer will review each submittal, mark with appropriate "Action", and where possible return within five (5) calendar days of receipt. Where the submittal must be held for coordination the Engineer will so advise the Contractor without delay.
- B. Action Stamp: The Engineer will stamp, sign and date each submittal copy to be returned to Contractor and indicate disposition of each submittal in accordance with the following grading requirements:
 1. "No Exception Taken" indicates that Engineer notes no exception to the intent of the Contract Documents. Fabrication of item may commence.
 2. "Furnish as Corrected" indicates that with minor corrections or additions, Engineer notes no exception to the intent of the Contract Documents. Item may be fabricated on basis of corrections noted. No further checking will be required.
 3. "Revise and Resubmit". No fabrication may commence.
 4. "Rejected" indicates nonconformance with the contract requirements, or that too many corrections would be necessary. The Engineer will state the reasons for rejections.
 5. "Submit Specified Item" indicates missing portions of the submissions. Fabrication may commence upon submission and approval of specified item.
- C. Engineer Review:
 1. Engineer's review of submitted drawings and data will cover only general conformity to drawings and specification, external connections, and dimensions which affect layout.
 2. Engineer's review does not indicate thorough review of all dimensions.
 3. Engineer's review of submittals does not relieve Contractor's responsibility for errors, omissions, or deviations, nor responsibility for compliance with Contract Documents.

1.6 RESUBMISSION REQUIREMENTS

- A. Make any corrections or changes in the submittals required by the Engineer and resubmit until they are denoted "No Exception Taken" or "Furnish as Corrected" by the Engineer. Resubmission requirements specified in individual specification sections, which differ from these requirements, will take precedence over these requirements.
- B. Shop Drawings and Product Data:
 1. Revise initial drawings or data, and resubmit as specified for the initial submittal.

2. Indicate any changes which have been made other than those requested by the Engineer.

C. Samples: Submit new samples as required for initial submittal.

1.7 DISTRIBUTION

A. Distribute reproductions of shop drawings and copies of product data which carry the Engineer stamp denoting "No Exception Taken" or "Furnish as Corrected" to:

1. Job site file.
2. Record documents file.
3. Subcontractors.
4. Supplier or fabricator.

B. Distribute samples which carry the Engineer's stamp denoting "No Exception Taken" or "Furnish as Corrected" as directed by the Engineer.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, and Division-1 Specification Sections, apply to work of this section.

1.2 REQUIREMENTS INCLUDED

- A. Furnish, install, and maintain temporary construction facilities required for construction, and remove at completion of work.
- B. Contractor shall provide temporary fencing to keep pedestrians and vehicles out of the work area during and outside construction hours. Gates shall be provided for entrance by the Contractor and Owner to maintain site operations. Gates shall be locked at the end of each work day to prohibit access by pedestrians and vehicles. Temporary fencing shall remain on-site until completion of the Work and written permission from the Owner.
- C. During installation of the perimeter security fencing, the Contractor shall provide temporary fencing as required to maintain a fully enclosed perimeter fence around the property during construction. At the end of each workday, prior to leaving the site, the Contractor shall install temporary security fence to leave no gaps or openings in the site perimeter.
- D. Conform to applicable local and state electrical codes.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with Federal, State, and Local Codes, Laws, Ordinances, and Regulations and with utility company requirements.

1.4 SUBMITTALS

- A. Submit drawings within fifteen (15) calendar days of starting work to Engineer for approval, showing layout, and details of temporary fencing.

1.5 JOB CONDITIONS

- A. The Owner is not responsible for damage to any or all facilities due to severe natural occurrences, vandalism, or negligence on the part of the Contractor. The Contractor shall take all necessary precautions to protect and deter potential theft and vandalism within the construction site.

1.6 COSTS

- A. Include all costs associated with furnishing, installing and removing temporary fencing and providing all equipment, furnishings, services, maintenance, and removal as part of lump sum bid for Mobilization/Demobilization.

1.7 PARKING

- A. Contractor shall direct his personnel to park in locations designated by the Owner to reduce the potential for conflicts with site operations. Where insufficient parking is available the Contractor shall make arrangements for the Contractor's personnel to park off-site and carpool to the work area.
- B. The Owner will not be responsible for any parking or traffic violations or towing expenses incurred by the Contractor's personnel, subcontractors, and suppliers. All fees will be paid by the Contractor or personnel at no additional cost to the Owner.

1.8 LOADING & DELIVERIES

- A. The Contractor shall notify the Owner prior to arrival of delivery trucks that may impede vehicular and pedestrian traffic.
- B. The Contractor shall schedule deliveries at time which will result in the minimal impact to the ongoing site operations and reduce potential for traffic entering or exiting the site.

1.9 ACCESS

- A. The Contractor shall provide temporary vehicle and pedestrian access to all buildings and trailers on-site during construction. Access routes shall be indicated on a phasing plan.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Materials must be new, and must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.
- B. Coordinate interruptions of permanent utilities with utility companies and affected users.
- C. All materials and labor required per installation shall be paid for by the Contractor.

2.2 MISCELLANEOUS CONSTRUCTION FACILITIES

- A. Storage Sheds:
 - 1. General: Install individual storage sheds as required to accommodate the work; sized, furnished and equipped properly. Sheds are defined to include both open shelters and fully enclosed spaces.
- B. Sign Materials:

1. Except as otherwise indicated, provide exterior type plywood of sizes and thickness indicated. Provide exterior-grade acrylic-latex-base enamel for painting sign panels and applying required graphics.
 2. Provide necessary signage in accordance with all applicable standards and regulations. Signage shall include but is not limited to:
 - a. RIDEM Permit File sign
- C. Temporary Fencing:
1. Due to the location of the site and proximity to a residential area, the Contractor shall provide temporary fencing around the work area, all construction facilities, and staging areas to prevent damage and loss of construction equipment and materials due to vandalism and trespassing. In addition, the Contractor shall provide temporary security fencing to maintain a secure site perimeter fence during construction.
 - a. Work Area Fencing
 - 1) Temporary fencing shall be portable minimum 2-inch, 9-gage, galvanized steel, chain link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8 inch outside diameter line posts and 2-7/8 corner and pull posts with 1-5/8 inch outside diameter top and bottom rails.
 - 2) Provide concrete bases to support posts. Sufficient bases shall be provided to keep fence upright in all environmental conditions. If larger bases are require, they shall be provided by the Contractor.
 - 3) Contractor is responsible to provide suitable temporary fencing that can withstand wind and other environmental factors. If larger fence posts, fabric or other components are required to provide a sturdy fence, they shall be provided by the Contractor at no additional expense to the Owner.
 - 4) Fallen portions of fence shall be repaired immediately to prevent pedestrians and vehicles from entering the site.
 - b. Secure Perimeter Fencing
 - 1) Temporary fencing shall be portable sections of galvanized steel chain link fabric fencing, minimum 8 feet high with galvanized steel pipe posts. Line posts shall be 2-3/8 inch outside diameter minimum and 2-7/8" corner and pull posts with 1-5/8 inch outside diameter top, mid, and bottom rails. Fence sections shall be no longer than 6 feet in length.
 - 2) Foundations shall be concrete bases capable of supporting posts.
 - 3) Temporary fence shall be set to prohibit entry meeting or exceeding the existing condition.
 - 4) Fence shall leave no more than a 4" gap between finish grade and the bottom of fence.
- D. Temporary Sanitation Facilities:
1. Provide temporary sanitation facilities in compliance with federal and state laws and regulations. Such facilities shall be properly secluded from public view and away from abutters.
 2. The Contractor shall be responsible to clean and maintain the facilities on a weekly basis or more frequently as required.

- E. Road & Sidewalks:
 - 1. Roads and sidewalks (outside of the limit of disturbance) to be kept open throughout construction. Provide temporary routes around construction when operations may temporarily block pedestrian or vehicular routes. All blockages and temporary routes are subject to review by the Owner. The Contractor must receive written permission from the Owner prior to blocking and pedestrian or vehicular route.

2.3 TEMPORARY UTILITIES

- A. Electric Service (if required)
 - 1. Temporary electric service shall be metered separately and costs shall be paid for by the Contractor prior to project completion.
 - 2. Temporary electrical service shall be installed in accordance with power company requirements. All services, wires, poles, meters, shall be placed in locations that will not impede vehicle or pedestrian circulation or present a safety hazards to site users.
 - 3. The Contractor is responsible for all permits and fee associated with providing a temporary electrical service on the site.
 - 4. Connection to the existing building electrical systems shall be at the disgression of the Owner. If permitted the Contractor will be required to meter electric used and reimburse the National Guard as required. The Contractor is responsible for all costs incurred to utilize the existing building electrical service if permitted by the Owner.
- B. Water Service (if required)
 - 1. The Contractor shall not make any connection to the existing water service unless permitted in writing by the Utility Company and Owner.
 - 2. All permit applications, fees, that may be required by the Utility Company shall be the responsibility of the Contractor at his own expense.
 - 3. A temporary water service connection shall be metered and the Contractor shall provide payment to the Utility Company prior to project completion.
 - 4. Connection to the existing building water system shall be at the disgression of the Owner. If permitted the Contractor will be required to meter water use and reimburse the National Guard as required. The Contractor is responsible for all costs incurred to utilize the existing building water service if permitted by the Owner

PART 3 - EXECUTION

3.1 INSTALLATION OF SUPPORT FACILITIES

- A. General: Use qualified tradesmen for installation of facilities. Locate facilities where they will serve the total project construction work adequately, and result in minimum interference with performance of the work. Relocate, modify and extend facilities as required during course of the work, to properly accommodate entire work of project. Provide a reasonably neat and uniform appearance in support facilities acceptable to the Owner.
- B. The Contractor is responsible to coordinate the location of temporary facilities in locations accepted by the Owner.

3.2 INSTALLATION

- A. Temporary fencing: Prior to commencing work, install chain link fencing with lockable entrance gates. Install in a manner to prevent pedestrians, vehicles, dogs and animals from easily entering the site except by entrance gates.

1. Set fence posts in compacted mixture of gravel where required for stability.
2. Provide gates in sizes and locations necessary to accommodate delivery vehicles and other construction operations.
3. Secure perimeter fencing shall be installed to not provide a length of temporary fencing greater than 8' long. Temporary security perimeter fencing shall be fixed with metal hardware to the existing and new fence sections. The panels of temporary security fencing shall meet or exceed the security of the existing fence.
4. Contractor is responsible to schedule demolition of existing perimeter fence and installation of new fence to minimize the gap between the fences, minimizing the length of secure temporary perimeter fencing required, and maintain a secure perimeter at the end of each workday.
5. The Contractor is responsible to provide all temporary fencing to meet the requirements above at no additional cost to the Owner.

3.3 REMOVAL OF TEMPORARY CONSTRUCTION FACILITIES

- A. Completely remove temporary materials and equipment when their use is no longer required.
- B. Temporary sheds, fence, barricades, signs, and other appurtenances related to prosecution of the work and not incorporated in the permanent construction shall be completely removed from the site prior to acceptance of work by Owner.

END OF SECTION

SECTION 01 56 00

TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of contract, and Division 1 Specification Sections, apply to work of this section.

1.2 REQUIREMENTS INCLUDED

- A. Controlling Contractor's operations and work.
- B. Furnishing, installing and operating temporary controls during construction for:
 - 1. Noise
 - 2. Dust
 - 3. Surface Water
 - 4. Pollution
 - 5. Debris and Clean Up
 - 6. Air Pollution
 - 7. Public Safety

1.3 WATER DISTRIBUTION SYSTEM

- A. The Contractor shall not draw water from the water distribution system on site unless permission is granted by the Utility Company and Owner in writing. If permission is granted, the Contractor shall adhere to all requirements of the Utility Company.
- B. Preparation and fees for permits required to connect to the water distribution shall be completed by the Contractor at no additional cost to the Owner.
- C. The Contractor shall not operate the water distribution system. Operation of the water distribution system shall be completed by the Utility Company only.

1.4 ELECTRICAL CONNECTION

- A. The Contractor shall coordinate a temporary electrical connection as required with National Grid of Rhode Island.
- B. Contractor shall not connect to existing electrical system without written permission of the Owner and Utility Company.

1.5 PRIVATE LAND

- A. The Contractor shall not enter or occupy private land outside of easements, except by written permission of the property owner. Furnish Owner copies of all agreements the Contractor has with property owners to enter or occupy private lands.
- B. Site shall be accessed through the entrance on South County Trail (Route 2). Access through neighborhoods adjacent to the project is prohibited.

1.6 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the Owner.
- B. Along the location of this work, all fences, walks, bushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner. All grass areas beyond the limits of construction, which have been damaged by the Contractor, shall be supplemented with loam borrow, regraded, and seeded, subject to the approval of the Owner.
- C. Trees close to the work shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are likely to be damaged because of his operations, but in no case shall any tree be cut or removed without prior notification of the Owner's Representative. All injuries to bark, trunk, limbs, and roots of trees shall be repaired by dressing, cutting and painting according to approved methods, using only approved tools and materials, subject to the approval of the Owner.
- D. The protection, removal, and replacement of existing physical features along the line of work shall be a part of the work under the Contract, and all costs in connection therewith shall be included in the unit and/or lump sum prices established under the items in the proposal.

1.7 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, electric and telephone cables, and cesspools adjacent to trench excavations, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operations shall be repaired by him at his expense, to the damaged items original condition.
- B. The Contractor shall bear full responsibility for obtaining all locations of underground structures and utilities (including existing water, gas, electric and telephone services, drain lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.
- C. Protection and temporary removal and replacement of existing utilities and structures as described in this section shall be a part of the work under the contract and all costs in connection therewith shall be included in the unit prices established in the proposal.

1.8 PROTECTION OF WORK

- A. The Contractor shall at all times protect excavations, trenches, new construction, old construction, all job materials, apparatus and fixtures from rain, wind, snow, ice, dust, dirt, mud, groundwater, back-up or leakage of sewers, drains, or other piping, and from water of any other origin, and shall remove promptly any accumulation of the above. Contractor shall provide and operate all pumps, piping and other equipment necessary to this end at no additional cost to Owner.

- B. Thoroughly protect all completed work and all stored materials.
- C. Provide boards, cloths, planks, waterproof paper, canvas or other approved protection and use as necessary to prevent any damage.
- D. Provide protective measures to prevent damage to lawns, trees, and shrubs to remain after project is complete.
- E. Protect, at end of each day's work, such work that may be liable to damage by the elements.
- F. Replace or rectify work or materials damaged by workmen, by the elements or by any other cause, to the satisfaction of the Owner and at no additional expense to the Owner.
- G. Repair streets, curbs, sidewalks, poles, grass, shrubs, trees, or other existing site features, if disturbed by building operations. Leave them in as good condition as they were before being disturbed.
- H. Do not allow workmen, including those of any Subcontractor or supplier, to mark finish surfaces with marking pens or other such devices, which are not readily erasable.
- I. Contractor shall be responsible for any and all damage to the Owner provided materials once delivered to the site. All materials shall be handled, stored, and installed in accordance with the manufacturers' recommendations.

1.9 SECURITY

- A. The Contractor shall take all precautions necessary to prevent loss or damage caused by vandalism, theft, burglary, pilferage, or unexplained disappearance of property of the Owner or Contractor, whether or not forming part of the work, located within the limits of work. The Contractor shall have full responsibility for the security of such property located in such areas and shall reimburse the Owner for any such loss, damage, or injury, except such as may be directly caused by agents or employees of the Owner.

PART 2 - MATERIALS

Not Used

PART 3 - EXECUTION

3.1 INTERFERENCE WITH EXISTING STRUCTURES

- A. Whenever it may be necessary to cross or interfere with existing culverts, drains, gas lines, water pipes or fixtures, guardrails, fences, or other structures needing special care, due notice shall be given to the Owner and to the various public and private agencies or individuals responsible for the utility or structure that is interfered with. Whenever required, all objects shall be strengthened to meet any additional stress that the work herein specified may impose upon it, and any damage caused shall be thoroughly repaired. The entire work shall be the responsibility of the Contractor and the work shall be performed at no additional expense to the Owner. All damaged items of work or items required to be removed and replaced due to construction shall be replaced or repaired by the Contractor to the complete satisfaction of the property Owners at no additional expense to the Owner.

3.2 REMOVAL OF WATER AND PROTECTION FROM FLOODING

- A. The Contractor shall construct and maintain, at no additional expense to the Owner, all pumps, drains, well points or any other facility for the control and collection of groundwater and/or surface water and provide all pumps and piping for the removal of water from the trenches and excavations so that all trenches and excavations may be kept at all times free from water and so that all construction work may be performed in the dry. Any damage resulting from the failure of the dewatering operations of the Contractor and any damage resulting from the failure of the Contractor to maintain the areas of all work in a suitable dry condition shall be repaired by the Contractor as directed by the or Owner at no additional expense to the Owner. The Contractor's pumping and dewatering operations shall be carried out in accordance with RIDEM regulations and in such a manner as to prevent damage to existing structures and utilities and the contract work and so that no loss of ground will result from these operations. Precautions shall be taken to protect new and existing work from flooding during storms or from other causes. Pumping shall be continuous where directed by the Owner to protect the work and/or to maintain satisfactory progress. All pipelines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected. Water from the trenches, excavations and drainage operations shall be pumped to a dewatering basin in such a manner as will neither cause public nuisance, nor cause injury to public health nor to public or private property nor to the work completed nor to the work in progress. No extra payment will be made for the removal of water, protection from flooding, drainage work, diversion of existing water courses and such other work, but compensation therefore shall be considered as having been included in the prices stipulated for the work within in the bid.

3.3 NOISE CONTROL

- A. The Contractor shall employ all reasonable measures to avoid unnecessary noise and ensure that noise is appropriate for normal ambient sound levels in the work area during working hours. Where required by agencies having jurisdiction, certain noise - producing work may have to be performed during specified periods only. Noise control measures during normal work hours shall include but not be limited to:
1. Operate machinery in a manner to cause least noise consistent with efficient performance of work.
 2. Equip all construction machinery and vehicles with sound-muffling devices.
 3. During construction adjacent to occupied buildings, erect screens or barriers to reduce noise in building to limits in accordance with applicable codes. Conduct operations in such a manner as to avoid unnecessary noise which might interfere with activities of building occupants.
- B. When the Contractor's work extends beyond normal working hours the Contractor shall incorporate to the complete satisfaction of the Owner, adequate noise prevention measures to insure minimum noise impact on the surrounding areas. Noise prevention measures shall include, but not be limited to:
1. Insulated enclosures.
 2. Hospital grade silencers or mufflers.
 3. Equipment modification.
 4. Special equipment, as necessary to meet City noise guidelines.
 5. Any other noise prevention measures.

- C. Should at any time the Owner determine that noise prevention measures are inadequate; the Contractor shall suspend all such work in question until acceptable measures are incorporated. Suspension of work due to inadequate noise prevention shall not be a cause for additional cost to the Owner.
- D. Prior to the start of any work outside normal work hours, the Contractor shall submit a Noise Control plan to the Owner for review. Noise Control plans shall be submitted for:
 - 1. Night work.
 - 2. All Pumping operations and work which extend beyond normal work day.
 - 3. Any other work as determined by the Owner which warrants special noise prevention measures.
- E. All costs associated with noise control measures shall be considered part of the bid price for appropriate work being completed.

3.4 DUST CONTROL

- A. At no additional cost to the Owner take measures to prevent unnecessary dust.
 - 1. Keep earth surfaces subject to dusting moist with water only.
 - 2. Cover dusty materials in piles or in transit to prevent blowing.
 - 3. Keep paved access roads clean from sediment.
 - a. Appropriate tracking pads shall be installed at site entrances to paved surfaces.
 - b. Sweeping, a minimum of weekly, during earthwork operations should be included.
- B. Protect buildings or operating facilities within property, which may be affected adversely by dust.
- C. Protect existing or new machinery, motors, instrument panels, or similar equipment with dust screens.
 - 1. Include proper ventilation with dust screens.

3.5 SURFACE WATER CONTROL

- A. Provide for drainage of storm water and such water as may be applied or discharged on site in performance of work.
- B. Ensure that drainage facilities are adequate to prevent damage to work, site, and adjacent property.
 - 1. Clean, enlarge, or supplement existing drainage channels to carry all increased runoff attributable to operation.
 - 2. Construct dikes to:
 - 3. Divert increased runoff from entering adjacent property (except in natural channels).
 - 4. Protect the work.
 - 5. Direct water to drainage channels or conduits.

3.6 POLLUTION CONTROL

- A. Prevent pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities.
 - 1. In order to protect the impoundment and downstream channel from hazardous materials releases by the construction equipment involved in this project, fueling shall take place off site (200'); equipment must be in good condition and inspected for leaks; spill control and cleanup equipment shall be stored on site; and the Contractor shall be responsible for all cleanup and remediation of hazardous materials releases.

2. Do not allow sanitary wastes to enter any drain or watercourse other than sanitary sewers.
3. Do not allow sediment, debris, or other substance to enter sanitary sewers and take measures to prevent such materials from entering any drain or watercourse.
4. All concrete repair work requiring cleaning and removal of debris is to be contained as not to contaminate the surrounding environment.

3.7 DEBRIS AND CLEANUP

- A. Keep all premises free at all times from accumulation of waste materials and rubbish.
 1. Immediately after unpacking, remove and dispose of all packing materials, case lumber, excelsior, wrapping, or other rubbish from site.
- B. Provide trash receptacles about site, and empty containers daily.
- C. Neatly stack construction materials, such as concrete forms and scaffolding, when not in use.
- D. Promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solution from surfaces to prevent marring or other damage to satisfaction of Owner.
- E. Ensure that wastes are not buried or burned on site or disposed into storm drains, sanitary sewers, streams, or waterways.
 1. Remove all wastes from site and dispose in a manner complying with local ordinances and antipollution laws.
 2. Store volatile wastes in covered metal containers and remove daily.
- F. Cleanup as determined by the Owner will be a condition for recommendation of progress payment application.
 1. Contractor shall have full responsibility for cleaning up during and immediately upon completion of work. Remove all rubbish, waste, tools, equipment, and appurtenances caused by and used in execution of work, leaving site clean, free of debris and in condition acceptable to Owner.
 2. Equipment or material shall not be left within any work area after acceptance of Contract without written permission of Owner. Do not abandon any material at or near site regardless of its value.

3.8 PUBLIC SAFETY

- A. At all times until final acceptance of Work by Owner, the Contractor shall protect Work and shall take all precautions of preventing injuries to persons or damage to property on or about site. Public safety in and around the project site is the responsibility of the Contractor.
- B. Contractor shall comply with all applicable laws, ordinances, rules, and regulations regarding safety of persons or property or with regard to protecting them from damage, injury, or loss and shall not load or permit any part of work to be placed so as to endanger safety of work.
- C. If Contractor constructs temporary bridges or provides temporary crossing of trenches, Contractor's responsibility for accidents shall include roadway and sidewalk approaches as well as structure of such crossings.
- D. Conduct work such that abutters shall have reasonable access to their property. Contractor shall be responsible for providing such reasonable safe means of access to public way as Owner deems essential. When it is necessary to leave materials and equipment upon highway or city or town way, place them so as to cause least possible obstruction to drainage, pedestrian, and other travel.

3.9 REMOVAL OF TEMPORARY CONTROLS

- A. Completely remove temporary materials and equipment when their use is no longer required.
- B. Upon completion of work of all trades and before final acceptance of entire project, each trade shall remove, at it's own expense, all wiring, appurtenances and accessories used in performance of its respective work
- C. Temporary sheds, utilities, barricades, signs, and other appurtenances related to prosecution of the work and not incorporated in the permanent construction shall be completely removed from the site prior to acceptance of work by Owner.

END OF SECTION

SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 REFERENCES

- A. 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 D 4439 | (2004) Geosynthetics |
| ASTM D 4491 | (1999a; R 2004e1) Water Permeability of Geotextiles by Permittivity |
| ASTM D 4533 | (2004) Trapezoid Tearing Strength of Geotextiles |
| ASTM D 4632 | (2008) Grab Breaking Load and Elongation of Geotextiles |
| ASTM D 4751 | (2004) Determining Apparent Opening Size of a Geotextile |
| ASTM D 4873 | (2002) Identification, Storage, and Handling of Geosynthetic Rolls and Samples |

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

| | |
|------------------|--|
| EPA 832-R-92-005 | (1992) Storm Water Management for Construction Activities Developing Pollution Preventions and Plans and Best Management Practices |
|------------------|--|

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

| | |
|---------------|---|
| 40 CFR 122.26 | Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25) |
|---------------|---|

1.3 STATE STANDARDS

- A. All work shall be performed in accordance with RI Department of Transportation Standard Specifications dated 2004, or latest revision, referred to herein as "State Standards".

1.4 SYSTEM DESCRIPTION

- A. The work consists of implementing the storm water pollution prevention measures to prevent sediment from entering streams or water bodies as specified in this Section in conformance with the requirements of the Drawings, the Specifications, and the requirements of the Rhode Island Pollution Discharge Elimination System (RIPDES) permit for this project.

1.5 EROSION AND SEDIMENT CONTROLS

- A. The controls and measures required of the Contractor are described below.
1. **Stabilization Practices** The stabilization practices to be implemented include temporary seeding, mulching, geotextiles, protection of trees, preservation of mature vegetation, etc. On the daily CQC Report, record the dates when the major grading activities occur, (e.g., clearing and grubbing, excavation, embankment, and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in paragraphs UNSUITABLE CONDITIONS and NO ACTIVITY FOR LESS THAN 21 DAYS, initiate stabilization practices as soon as practicable, but no more than 14 days, in any portion of the site where construction activities have temporarily or permanently ceased.
- B. **Unsuitable Conditions**
1. Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases or is precluded by unsuitable conditions caused by the weather, initiate stabilization practices as soon as practicable after conditions become suitable.
- C. **No Activity for Less Than 21 Days**
1. When the total time period in which construction activity is temporarily ceased on a portion of the site is 21 days minimum, stabilization practices do not have to be initiated on that portion of the site until 14 days have elapsed after construction activity temporarily ceased.
- D. **Burnoff**
1. Burnoff of the ground cover is not permitted.
- E. **Protection of Erodible Soils**
1. Immediately finish the earthwork brought to a final grade, as indicated or specified, and protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.
- F. **Erosion, Sediment and Stormwater Control**
1. All work shall be performed in accordance with the requirements of the permit granted by the Rhode Island Department of Environmental Management (RIDEM).
- G. **Stormwater Drainage**
1. There will be no discharge of excavation ground water to the sanitary sewer, storm drains, or to the vegetated areas without prior specific authorization of the Environmental Programs Division in writing. Discharge of hazardous substances will not be permitted under any circumstances. Construction site runoff will be prevented from entering any storm drain or the vegetated area directly by the use of filter socks or other method suitable. Provide erosion protection of the surrounding soils.
- H. **Structural Practices**
1. Implement structural practices to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Implement structural practices in a timely manner, during the construction process, to minimize erosion and sediment runoff. Include the following devices; Location and details of installation and construction are shown on the drawings.
- I. **Silt Fences**
1. Provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Properly install silt fences to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill

erosion (e.g. clearing and grubbing, excavation, embankment, and grading). Install silt fences in the locations indicated on the drawings. Obtain approval from the Owner prior to final removal of silt fence barriers.

J. Compost Filter Sock

1. Provide Compost Filter Socks as a temporary structural practice to minimize erosion and sediment runoff. If socks are used, properly place the socks to effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, excavation, embankment, and grading) in each independent runoff area (e.g., after clearing and grubbing in a area between a ridge and drain, place the socks as work progresses, remove/replace/relocate the socks as needed for work to progress in the drainage area). Show on the drawings areas where socks are to be used. The Owner will approve the final removal of straw bale barriers. Provide rows of Compost Filter Socks as follows:
 - a. Along the downhill perimeter edge of all areas disturbed.
 - b. Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.
 - c. Along the toe of all cut slopes and fill slopes of the construction areas.
 - d. Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverse disturbed areas or carry runoff from disturbed areas. Space the rows as shown on the drawings.
 - e. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Space the rows as shown on the drawings.
 - f. At the entrance to culverts that receive runoff from disturbed areas.

K. Vegetation and Mulch

1. Provide temporary protection on sides and back slopes as soon as rough grading is completed or sufficient soil is exposed to require erosion protection. Protect slopes by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Stabilize slopes by hydroseeding, anchoring mulch in place, covering with anchored netting, sodding, or such combination of these and other methods necessary for effective erosion control.
2. Seeding: Provide new seeding where ground is disturbed. Include topsoil or nutriment during the seeding operation necessary to establish a suitable stand of grass. The seeding operation will be as specified on the Drawings and Specifications.

1.6 SUBMITTALS

- A. Architect/Engineer Review and Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTALS:
1. SD-01 Preconstruction Submittals
 - a. At least 14 days prior to intended use, the contractor shall provide the following samples and/or submittals for approval. Do not order materials until the Architect's approval of samples, certifications or test results has been obtained. Delivered materials shall closely match the approved samples.
 - b. Silt Fence: Submit manufacturer's material specifications and installation instructions.
 - c. Mulch Material: Submit on Cubic Foot Sample.
 2. Pollution prevention plan and Notice of intent for NPDES coverage under the general permit for construction activities
 3. SD-06 Test Reports
 - a. Storm Water Inspection Reports for General Permit
 - b. Erosion and Sediment Controls
 4. SD-07 Certificates
 - a. Mill Certificate or Affidavit
 - b. Certificate attesting that the Contractor has met all specified requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Identify, store and handle filter fabric in accordance with ASTM D 4873.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Refer to Section 31 11 00 and Section 31 32 11 for product information.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Section 31 11 00 and Section 31 32 11 for product installation.

3.2 FIELD QUALITY CONTROL

- A. Maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. Use the following procedures to maintain the protective measures.

3.3 SILT FENCE MAINTENANCE

- A. Inspect the silt fences in accordance with paragraph, titled "Inspections," of this section. Any required repairs shall be made promptly. Pay close attention to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, replace the fabric promptly. Remove sediment deposits when deposits reach one-third of the height of the barrier. Remove a silt fence when it is no longer required. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall receive erosion control except that the coverage requirements in paragraph, titled "Establishment" of this section do not apply.

3.4 COMPOST FILTER SOCK MAINTENANCE

- A. Inspect Compost Filter Socks in accordance with paragraph, titled "Inspections". Pay close attention to the repair of damaged Socks, end runs and undercutting beneath Socks. Accomplish necessary repairs to barriers or replacement of socks in a promptly manner. Remove sediment deposits when deposits reach one-half of the height of the barrier. At the each end of each row turn Socks uphill when used to retain sediment. Remove a sock barrier when it is no longer required. The immediate area occupied by the socks and any sediment deposits shall be shaped to an acceptable grade. Seed the areas disturbed by this shaping in accordance with the Drawings and Specifications.

3.5 INSPECTIONS

- A. General
 1. Inspect disturbed areas of the construction site, areas that have not been finally stabilized used for storage of materials exposed to precipitation, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or

more rainfall at the site. Conduct inspections at least once every month where sites have been finally stabilized.

B. Inspections Details

1. Inspect disturbed areas and areas used for material storage that are exposed to precipitation for evidence of, or the potential for, pollutants entering the drainage system. Observe erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan to ensure that they are operating correctly. Inspect discharge locations or points to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Inspect locations where vehicles exit the site for evidence of offsite sediment tracking.

C. Inspection Reports

1. For each inspection conducted, prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. Furnish the report to the Owner within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

- D. All temporary erosion control facilities and accumulated sediments shall be removed and legally disposed of in a neat and workman like manner when all disturbed areas have been satisfactorily stabilized.

END OF SECTION

SECTION 01 60 00

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Material and Equipment incorporated into the Work:
 - 1. Conform to applicable specifications and standards.
 - 2. Comply with size, make, type, and quality specified, or as specifically reviewed by the Engineer.
- B. Manufactured and Fabricated Products:
 - 1. Design, fabricate and assemble in accordance with the best engineering and shop practices.
 - 2. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
 - 3. Two or more items of the same kind shall be identical, by the same manufacturer.
 - 4. Products shall be suitable for service conditions.
- C. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically reviewed by Engineer.
- D. Do not use material or equipment for any purpose other than that for which it is designed or is specified.
- E. All products shall be manufactured in the United States of America.

1.2 MANUFACTURER'S INSTRUCTIONS

- A. When the Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain, and distribute copies of such instructions to parties involved in the installation, as specified in Section 01 33 00, SUBMITTALS.
- B. Maintain one set of complete instructions at the job site during installation and until completion.
- C. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformity with specified requirements.
- D. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Owner, Engineer, and Manufacturer to determine how to proceed.
- E. Do not proceed with work without clear instructions.
- F. Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by the Contract Documents.

1.3 TRANSPORTATION AND HANDLING

- A. Deliveries shall be coordinated with the Owner's access requirements.

- B. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site and also when two or more trades, Contractors, or suppliers are involved.
- C. Transport all materials and equipment on legally approved conveyances as required or recommended by the respective manufacturer or supplier.
- D. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
- E. Receive and handle all materials and equipment, at the project site, by conveyances or methods as recommended by the respective manufacturer or supplier to prevent damage to products.
- F. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and reviewed submittals, and that products are properly protected and undamaged.
- G. Remove from the site any material or item of equipment damaged during the transportation or handling process, and immediately replace at no additional cost to the Owner.

1.4 STORAGE AND PROTECTION

- A. Store products in accordance with the manufacturer's instructions, with seals and labels intact and legible.
- B. Store products subject to damage by the elements in weather tight enclosures.
- C. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
- D. Maintain all storage areas in a clean and orderly condition at all times.

1.5 EXTERIOR STORAGE

- A. Store fabricated products above the ground on blocking or skids and prevent soiling or staining. Cover products, which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
- B. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.
- D. Replace any material or item of equipment damaged, due to inadequate storage protection, and immediately replace at no additional cost to the Owner.

1.6 PROTECTION AFTER INSTALLATION

- A. Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

1.7 CERTIFICATES OF CONFORMANCE AND MANUFACTURE

- A. In addition to other requirements specified herein, the Contractor shall furnish to the Engineer, as specified in Section 01 33 00, SUBMITTALS, notarized certificates of conformance and manufacture that all materials and/or equipment to be furnished under this contract meet the specification requirements. When directed, each shipment of material shall be accompanied by the manufacturer's notarized certificates of conformance and manufacture. Unless otherwise specifically specified, all testing of materials shall be provided by the Contractor at no additional expense to the Owner.
- B. Each manufacturer's certificate shall be endorsed or accompanied by the Contractor's certificate that the material certified by the manufacturer will be the material incorporated in the work.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Comply with requirements stated in conditions of the contract and in specifications for administrative procedure in closing out the work.

1.2 SUBSTANTIAL COMPLETION

- A. When Contractor considers the work is substantially complete, he shall submit to Owner.
 - 1. A written notice that the work, or designated portion thereof, is substantially complete.
 - 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, Owner will review the work to determine the status of completion.
- C. Should Owner determine that the work is not substantially complete:
 - 1. Owner will promptly notify the Contractor in writing, giving the reasons therefor.
 - 2. Contractor shall remedy the deficiencies in the work, and send out another written notice of substantial completion to the Owner.
 - 3. Owner will again review the work.
- D. When Owner concurs that the work is substantially complete, he will:
 - 1. Prepare a certificate of substantial completion, accompanied by Contractor's list of items to be completed or corrected, as verified and amended by the Owner.
 - 2. Submit the certificate to Contractor and manufacturer for their written acceptance of the responsibilities assigned to them in the certificate.

1.3 FINAL REVIEW

- A. When Contractor considers the work is complete, he shall submit written certification that:
 - 1. Contract documents have been reviewed.
 - 2. Work has been inspected for compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents.
 - 4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
 - 5. Work is completed and ready for final review.
- B. Owner will take final review to verify the status of completion with reasonable promptness after receipt of such certification. Final review shall include operation of both gates.
- C. Should Owner consider that the work is incomplete or defective:
 - 1. Owner will promptly notify the Contractor in writing, listing the incomplete or defective work.

2. Contractor shall take immediate steps to remedy the stated deficiencies, and send out another written certification to Owner that the Work is complete.
3. Owner will again review the Work.

D. When the Owner finds that the Work is acceptable under the Contract Documents and that all punch list items have been accomplished to his satisfaction, he shall request the Contractor to make closeout submittals.

1.4 FEES FOR ADDITIONAL REVIEWS

- A. Should Owner perform additional reviews due to failure of the Work to comply with the claims of status of completion made by the Contractor:
1. Owner will be compensated for such additional services.
 2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.5 CONTRACTOR'S CLOSEOUT SUBMITTALS TO OWNER

- A. Operating and Maintenance Data:
1. Instruct the Owner's personnel with regard to equipment, systems and operating specialties which are installed as part of this project.
 2. Submit brochures indicating operating instructions and maintenance schedules for all equipment, systems, operating devices and specialties, as specified in Section 01340, SUBMITTALS.
 3. Submit detailed maintenance methods and schedules for all materials and equipment provided in this project, as specified in Section 01 33 00, SUBMITTALS.
- B. Warranties, Guarantees, and Bonds:
1. In addition to the Warranty and Guarantee Requirements of the General Conditions, provide all other guarantees, bonds, affidavits and certifications required throughout the specifications.
- C. Spare parts and maintenance materials for Owner.
- D. Contractor's affidavit of payment of debts and claims.
- E. Contractor's affidavit of release of liens.
- F. Consent of surety to final payment.
- G. Certificate of insurance for products and completed operations.
- H. Project Record Drawings

1.6 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to Owner.

- B. Statement shall reflect all adjustments to the contract sum:
 - 1. The original contract sum.
 - 2. Additions and deductions resulting from:
 - a. Previous change orders.
 - b. Allowances.
 - c. Unit prices.
 - d. Deductions for uncorrected work.
 - e. Deductions for liquidated damages.
 - f. Deductions for re-inspection payments.
 - g. Other adjustments.
 - 3. Total contract sum, as adjusted.
 - 4. Previous payments.
 - 5. Sum remaining due.

- C. Owner will prepare a final change order reflecting approved adjustments to the contract sum which were not previously made by change orders.

- D. Contractor shall also provide record from utility companies indicating payment of all fees and costs for temporary utilities used during construction.

1.7 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit the final application for payment in accordance with procedures and requirements stated in the General Conditions.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Maintain at the site for the Owner one record copy of
 1. Drawings
 2. Specifications
 3. Addenda
 4. Change orders and other modifications to the contract
 5. Engineer field orders or written instructions
 6. Reviewed shop drawings, product data and samples
 7. Field test records

- B. The Contractor will be required to furnish, at no additional expense to the Owner, the services of a surveyor and/or Engineer registered in the state where the project is located and under whose direction shall be obtained and recorded all surveys, measurements and such other data required for the determination of the as-built records of the construction of all site work.

1.2 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
- B. Provide locked file cabinet for storage of documents.
- C. Provide locked cabinet space for storage of samples.
- D. File documents and samples in accordance with CSI/CSC format.
- E. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- F. Make documents and samples available at all times for inspection by Engineer and Owner.

1.3 MARKING DEVICES

- A. Provide felt tip marking pens for recording information in the color code designated by Engineer.

1.4 RECORDING

- A. Label each document "Project Record" in neat large printed letters.
- B. Record information concurrently with construction progress.
- C. Do not conceal any work until required information is recorded.

- D. Drawings: Principal dimensions, elevations and other data, as required, shall be recorded for all work, such as:
 - 1. Deviations of any nature made during construction.
 - 2. Location and elevation of underground utilities in relation to permanent landmarks and benchmarks.
 - 3. Field changes of dimension and detail.
 - 4. Changes made by field order or by change order.
 - 5. Details not on original contract drawings.
- E. The marked-up prints shall be inspected by the Engineer and shall be corrected immediately if found either inaccurate or incomplete.
- F. Specifications and Addenda: Legibly mark each section to record:
 - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - 2. Changes made by field order or by change order.

1.5 FINAL MEASUREMENTS

- A. The Contractor shall provide qualified personnel and equipment for taking final measurements for quantities and record documents.

1.6 RECORD DRAWINGS

- A. At the completion of the project, the record prints shall be submitted to the Engineer for final review and comment.
- B. The Contractor shall correct, amplify and do all other work as may be required by the Engineer to complete the drawings in a manner satisfactory to the Engineer and at no additional cost to the Owner.
- C. Upon approval, the Contractor shall provide a final record drawing set to the Owner in both hardcopy and PDF electronic format. All "as-built" documents shall be provided to the Owner and Engineer in both hardcopy form, in PDF format, and in CAD format.
- D. Record drawings shall indicate the location of all underground utilities, invert elevations at each structure and finish grade elevations within the limit of disturbance.

1.7 SUBMITTAL

- A. At contract close-out, deliver record documents to Engineer for the Owner.
- B. Accompany submittal with transmittal letter in duplicate, containing:
 - 1. Date
 - 2. Project title and number
 - 3. Contractor's name and address
 - 4. Title and number of each record document
 - 5. Signature of Contractor or his authorized representative

PART 2 – PRODUCTS

Not Used

Pare Corporation

Camp Fogarty Culvert Replacement
18200.00

PART 3 – EXECUTION

Not Used

END OF SECTION

Division 02 – Not Used

Division 03 – Concrete

SECTION 03 11 00

CONCRETE FORMWORK

PART 1 - GENERAL

1.1 GENERAL

- A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE

- A. This section specifies requirements for concrete formwork to produce cast-in-place concrete structures as shown on the Drawings and as specified herein. The work shall consist of designing, furnishing, constructing and removing formwork for all cast-in-place concrete structures.
- B. Use forms, wherever necessary, to confine the concrete and shape it to the required lines, and to provide the specified finish. Construct forms with sufficient strength to structurally support the work, and withstand the pressure resulting from placement and vibration of the concrete, and maintain forms rigidly in position. Construct forms sufficiently tight to prevent loss of mortar from the concrete.

1.3 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 117: Standard Specification for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301: Standard Specification for Structural Concrete.
 - 3. ACI 347: Guide to Formwork for Concrete.
- B. Rhode Island State Building Code.

1.4 DESIGN REQUIREMENTS

- A. Design formwork to support vertical loads and lateral pressures resulting from placement and vibration of concrete in accordance with the requirements of ACI 301 and ACI 347, and as specified herein.
- B. Camber the formwork to compensate for anticipated deflections due to the weight and pressure of the fresh concrete and due to construction loads.
- C. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations. Use wedges or jacks, individually or in combination for adjustment.
- D. Design forms and falsework to include assumed values of live loads, dead load, weight of moving equipment operated on formwork, concrete mix, height of drop, vibrator frequency, ambient temperature, lateral stability, and other factors pertinent to the safety of the structure during construction.
- E. Provide and design forms to conform with expansion and construction joint locations.

1.5 SUBMITTALS

- A. Submittals for the following items shall be made in accordance with the requirements as specified. Refer to Section 01 33 00 SUBMITTAL PROCEDURES for provisions and procedures.
- B. Submit the following at least 30 days before the first concrete placement:
 - 1. Manufacturer's data and installation instructions for proprietary form accessories, form coatings, pipe sleeves and seals, form ties and manufactured form systems if used.
 - 2. Certification that form coatings comply with the requirements of this Section.

1.6 QUALITY ASSURANCE

- A. Provide in accordance with the requirements as specified.
- B. Tolerances:
 - 1. Permissible surface irregularities for the various classes of concrete surface finish as specified in Section 03 30 00, Cast-in-Place Concrete, are defined as "finishes", and are to be distinguished from tolerances as specified herein. Deviations from the established lines, grades, and dimensions will be permitted to the extent set forth herein.
 - 2. The tolerance limits specified in this Section and the surface finish irregularities permitted in Section 03 30 00, Cast-in-Place Concrete, are not the limits to which forms may be built or by which damaged from sheathing may be used. These limits are provided only for the occasional slight misalignment or irregularity of surface, which may occur despite a serious effort to build and maintain the forms accurately and securely with an even surface. These limits will be allowed only for inadvertent or relatively infrequent irregularities of the degree mentioned, but practices and form materials will be prohibited which without doubt will result in the creation of additional irregularities, even though these would be within the limits specified.
 - 3. Where specific tolerances are not stated herein or shown on the Drawings for a structure, portion of a structure, or other feature of the work, permissible deviations will be interpreted conforming to the tolerances stated herein for similar construction. Specific maximum or minimum tolerances as shown on the Drawings in connection with any dimension shall be considered as supplemental to the tolerances specified herein and shall govern. Concrete forms shall be set and maintained within the tolerance limits necessary to ensure that the completed work will be within the tolerances specified. Concrete construction that exceeds the tolerance limits specified or as shown on the Drawings shall be remedied or removed and replaced by the Contractor at no cost to the Owner.
- C. Tolerances shall be as specified in ACI 117, Standard Specifications for Tolerances for Concrete and Materials.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Forms for Exposed Finish Concrete: Construct formwork for exposed concrete surfaces with smooth faced undamaged plywood or metal, metal-framed plywood faced or other acceptable panel-type facing materials approved by Engineer, to provide continuous, straight, smooth as-cast surfaces, and produce a uniform and consistent texture and pattern on the surfaces. Metal patches on forms for these surfaces will not be permitted. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on the drawings.

1. Use overlaid plywood complying with U.S. Product PS-1 "A-C or B-B High Density Overlaid Concrete Form", Class I.
 2. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Tubular Fiber Forms:
1. Provide forms with spirally constructed laminated plies of fiber.
 2. Provide forms with wall thickness as recommended by the manufacturer to meet load requirements of the various uses and sizes.
 3. Provide forms with wax coated outside surfaces for moisture resistance.
 4. Provide forms with inside surface coated with bond-breaker compound.
- D. Form Ties:
1. Form Ties: For concrete structures, which will not be in view or buried below finish grade, use carbon steel factory-fabricated, removable or stay in place snap-off type form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units, which will leave no metal closer than 1-1/2" to surface. Provide ties which, when removed, will leave holes not larger than 1" diameter in concrete surface. Patch all holes with non-shrink grout.
 2. Form ties and spreaders for walls in areas exposed to view shall be Stainless Steel Cone-Tight Tyscru by Richmond Screw Anchor Co.; Dayton Sure-Grip and Shore Co.; or substitute approved by Engineer with Plastic cone-tight type cones having a 1" setback and a taper from 1" to 1-1/4". Tycone holes shall be sealed with plastic set back plugs, color as selected by Engineer from manufacturer's standard color selection or filled with non-shrink grout. Tyscru ties shall be sized to satisfy loading requirements.
 3. In lieu of form ties specified above, fiberglass form tie systems shall be used. Fiberglass form ties shall be standard gray color. The concrete structure shall be finished by grinding the fiberglass form tie flush with the finish surface of the concrete structure.
 - a. If tapered architectural holes are required, dummy tapered cones having a 1" setback and a taper from 1" to 1-1/4 shall be fastened to the interior of the formwork to achieve the specified pattern on the finish structure.
- E. Form Releasing Agents: Provide commercial formulation form-releasing agents that will not bond with, stain, nor adversely affect concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds. Volatile organic compound emissions of form coating agent shall not exceed 2.09 pounds per gallon (350 mg/L grams per liter).
- F. Chamfer Strips: Provide 1-inch triangular fillets, unless noted otherwise on drawings, to form all exposed concrete corners. Material shall be rubber or polyvinyl chloride type, or smooth clear, sealed softwood.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the substrate and conditions under which work of this Section is to be performed, and correct unsatisfactory conditions, which would prevent proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 FORM CONSTRUCTION

A. General:

1. Construct forms as designed and in accordance with Contractor's approved working drawings conforming to ACI 347, to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, level, and plumb work in finished structures.
2. Provide for openings, offsets, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required. Use selected materials to obtain required finishes.
3. Forms for concrete which accommodate work of other trades, fabricated before the opportunity exists to verify the measurements of adjacent construction, shall be accurately sized and located as dimensioned on the Drawings. In the event that deviation from the Drawing dimensions results in problems in the field, the Contractor shall be responsible for resolution of the conditions as approved by the Engineer, at no cost to the Owner.

B. Fabrication:

1. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage concrete surfaces.
2. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to temporary openings on forms in as many inconspicuous locations as possible, commensurate with design requirements. Form intersecting planes to provide true, clean cut corners.

C. Falsework:

1. Erect falsework and support, brace, and maintain it to safely support vertical, lateral, and asymmetrical loads applied until complete structure has attained design strength. Construct falsework so that adjustments can be made for take-up and settlement, and access is provided for inspection.
2. Provide wedges, jacks or chamfer strips to facilitate vertical adjustments. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure; make necessary adjustments to product work of required dimensions.

D. Forms for Exposed Concrete:

1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes
2. Provide sharp clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or grits to maintain true, square intersections.
3. Use extra studs, walers, and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material, which will produce bow.

E. Corner Treatment:

1. Unless shown otherwise, form chamfers with 1-inch by 1-inch strips, accurately formed and surfaced to produce uniformly straight lines and tight edge joints on exposed concrete. Extend terminal edges to required limits and miter chamfer strips at changes in direction.

F. Control Joints: Locate as indicated on the Drawings.

G. Provision for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Verify size and location of openings, recesses and sleeves with the trade requiring such items. Accurately place and securely support items to be built into forms.

- H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove encrusted mortar and grout, chips, wood, sawdust, dirt, and other debris just before concrete is placed. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.

3.3 FORM COATINGS

- A. Coat form contact surfaces with form-releasing agent before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come into contact with surfaces that will be bonded to fresh concrete. Apply in strict compliance with manufacturer's instructions.
- B. Remove surplus coating on form surfaces before placing concrete.

3.4 INSTALLATION OF EMBEDDED ITEMS

- A. Set and build into the forms, anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of the items to be attached thereto.
- B. Set edge forms or bulkheads and intermediate screed strips for slabs, to obtain required elevation and contours in the finished slab surface. Provide and secure units to support types of screeds required.

3.5 REMOVAL OF FORMS

- A. Formwork not supporting concrete, such as sides of walls, columns, and similar parts of the Work, may be removed after cumulatively curing at not less than 50 degrees F for 72 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operation, and provided that curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as elevated beams, joists, slabs and other structural elements may not be removed until concrete has attained 70% of its design minimum 28-day compressive strength, and has cumulatively cured for no less than 7 days. Concrete shall have sufficient strength to safely support its own weight and construction live loads and lateral pressures. Determine potential compressive strength of in-place concrete testing field-cured specimens representative of the concrete location or members, as specified in Section 03 30 00, Cast-in-Place Concrete.
- C. Form facing material may be removed one day after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.
- D. Form ties: The concrete structure shall be finished by grinding the fiberglass form ties flush with the finish surface of the concrete structure.

3.6 REUSE OF FORMS

- A. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. When forms are reused for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Apply new form releasing agent to all form areas that will be in contact with concrete.

- B. Do not reuse forms if there is any evidence of surface wear and tear, splits, fraying, delamination or other damage which would impair the quality of the concrete surface or prevent obtaining the specified concrete finish.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE

- A. This Section specifies all work necessary to provide all concrete reinforcement such as reinforcing steel, welded wire fabric, and concrete inserts as shown on the Drawings and as specified herein.

1.3 REFERENCES

- A. American Concrete Institute (ACI)
 - 1. ACI 315: Details and Detailing of Concrete Reinforcement
 - 2. ACI 315R: Manual of Engineering and Placing Drawings for Reinforced Concrete Structures
- B. American Society for Testing and Materials (ASTM):
 - 1. A185: Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement
 - 2. A 615: Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - 3. A 706/A 706M: Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement
- C. American Welding Society (AWS):
 - 1. AWS D1.4: American Welding Society, Structural Welding Code, and Reinforcing Steel.
- D. Rhode Island State Building Code

1.4 SUBMITTALS

- A. Submittal for the following items shall be made in accordance with the requirements as specified.
- B. Shop Drawings:
 - 1. Shop drawings for reinforced concrete structures shall be submitted after the concrete pour sequences, construction joint locations, and placement schedules have been approved by the Engineer.
 - 2. At least 30 days before each scheduled concrete placement, submit shop drawings covering the reinforcing steel details, bar lists, support bars and details, locations of reinforcing bar cut-offs, splices, development lengths and placement details. Prepare shop drawings in accordance with ACI 315 and 315R from reinforcement details shown on the drawings.
 - 3. Mill Certificates: Accompanying the shop drawings, submit steel producer's certification of mill analysis, tensile, and bend tests for reinforcing steel.

4. Welder's certification in conformance with AWS D1.4, when welding is indicated or specified. Testing of welds shall be conducted and witnessed by an independent testing laboratory prior to welding of reinforcement. Maintain qualification and certification records at the job site, readily available for examination of test results.
- C. Manufacture's literature including installation instructions for the following.
1. Supports

1.5 QUALITY ASSURANCE

- A. Provide in accordance with the requirements of the Quality Control section and as specified.
- B. Do not fabricate reinforcement until shop and placement drawings have been approved by the Engineer.
- C. Tolerances:
 1. Tolerances shall be as specified in ACI 315R.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver reinforcement to the job site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on shop drawings.
- B. Storage: Store reinforcement at the job site in a manner to prevent damage and accumulation of dirt and excessive rust.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcing bars shall be newly rolled deformed bars conforming to ASTM A615 Grade 60, unless otherwise indicated on the Drawings.
 1. Bars to be welded shall conform to ASTM A706 deformed, Grade 60.
 2. Provide mill bent reinforcing bars, bent cold to the dimensions indicated and conforming to the requirements of ACI SP-66.
- B. Welded wire fabric shall conform to ASTM A 185, with a minimum ultimate tensile strength of 70,000 psi. Provide in sizes indicated. Provide support bars and reinforcing bar supports as specified to obtain the concrete cover.
- C. Bar support and accessories shall be galvanized or plastic coated and shall conform to ACI 315. Provide minimum size number 5 support bars.
- D. Provide 3-in. by 3-in. plain precast concrete blocks and precast concrete doweled blocks for reinforcing bar supports in foundation mats, base slabs, footings, pile caps, grade beams and slabs on grade. Provide block thickness to produce concrete cover of reinforcement as indicated. Provide blocks of Type II cement with 3000 psi minimum compressive strength in conformance with the Section 03 30 00, Cast-in-Place Concrete.
- E. Wire for tying reinforcement in place shall be No. 16 AWG or heavier black soft-annealed wire

2.2 FABRICATION

- A. Fabricate reinforcement only after shop drawings have been returned by the Engineer marked "Approved".
- B. Provide reinforcing bars that have been cut and bent before shipment. If bars must be bent on site, bend reinforcing steel cold, and do not straighten or rebend in a manner, which will damage the material. Bend in conformance with requirements of ACI SP-66 or with ASTM A767 when reinforcement is to be galvanized.
- C. Splices:
 - 1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying for the full length of the splice. All lap splices shall be ACI 318, Class B, unless indicated otherwise on the Drawings.
- D. Adjacent splices shall be staggered whenever possible.

PART 3 - EXECUTION

3.1 GENERAL

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended Practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

3.2 PLACEMENT

- A. Comply with the specified standards for details and methods of reinforcement placement and supports, and as herein specified. Comply with concrete protective cover requirement indicated on the Drawings.
- B. Clean reinforcement to remove loose rust and mill scale, earth, and other materials that would reduce or destroy bond with concrete.
- C. Position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
- D. Place reinforcement to obtain the specified coverage for concrete protection. Arrange, space, and securely tie bars and bar supports together with wire, to hold reinforcement accurately in position during concrete placement operation. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
- E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh.
- F. Provide supports of sufficient numbers and strengths to carry reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for conveying equipment and similar construction loads.
- G. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits or embedded items. Bars moved more than three inches are subject to approval of Engineer. Place required number of bars.

- H. Position dowels accurately, rigidly support, and securely tie. Align dowels normal to concrete surface before concrete placement. Setting dowels into wet concrete is prohibited.
- I. Provide and place safety caps on all exposed ends of vertical reinforcement.
- J. Tie a minimum of 25 percent of all intersecting bars in foundation mats, base slabs, footings, pile caps, slabs on grade and elevated slabs.
- K. Do not splice reinforcement steel in foundation mats, base slabs, beams, girders, slabs and walls at points of maximum stress unless otherwise indicated.
- L. Lap splice welded wire fabric reinforcement at least one full mesh. Stagger splices to avoid continuous laps in either direction and wire tightly together. Straighten rolled welded wire fabric reinforcement into flat sheets before use.
- M. Provide continuous reinforcement through construction joints.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE

- A. This Section specifies requirements for furnishing, placement, finishing, curing and protecting of all concrete, plain and reinforced as shown on the Drawings and as specified herein. Review and approval of the Contractor's Working drawings by the Engineer does not relieve the Contractor of the responsibility for the adequacy of Work.

1.3 REFERENCES

- A. General: All work specified in this Section shall conform to "Standard Specifications for Road and Bridge Construction" of the Rhode Island Department of Transportation, latest revision, herein referred to as "State Standards". Where the language in any of the documents referred to herein be in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory for these Specifications.
- B. American Concrete Institute (ACI):
 - 1. ACI 117: Standard Tolerances for Concrete Construction and Materials
 - 2. ACI 211.2: Standard Practice for Selecting Proportions for Structural Lightweight Concrete
 - 3. ACI 213: Guide for Structural Lightweight Aggregate Concrete
 - 4. ACI 301: Specifications for Structural Concrete
 - 5. ACI 302: Guide for Concrete Floor and Slab Construction
 - 6. ACI 304R: Guide for Measuring, Mixing, Transporting and Placing Concrete.
 - 7. ACI 305R: Hot Weather Concreting
 - 8. ACI 306: Cold Weather Concreting
 - 9. ACI 308: Standard Practice for Curing Concrete
 - 10. ACI 309R: Guide for Consolidation of Concrete
 - 11. ACI 318: Building Code Requirements for Structural Concrete
- C. American Society for Testing and Materials (ASTM):
 - 1. C31 Making and Curing Concrete Compression and Flexural Strength Test-Specimens in the Field
 - 2. C33 Specification for Concrete Aggregates
 - 3. C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - 4. C94 Specifications for Ready Mixed Concrete
 - 5. C127 Standard test method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
 - 6. C136 Sieve Analysis of Fine and Coarse Aggregate
 - 7. C138 Unit Weight, Yield, and Air Content of Concrete
 - 8. C143 Test for Slump of Portland Cement Concrete
 - 9. C150 Specification for Portland Cement
 - 10. C171 Sheet Materials for Curing Concrete

11. C172 Sampling Fresh Concrete
 12. C173 Standard test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
 13. C205 Standard Specifications for Portland Blast Furnace Slag Cement
 14. C231 Test for Air Content of Freshly Mixed Concrete by the Pressure Method
 15. C260 Specification for Air-Entraining Admixtures for Concrete
 16. C309 Specification for Liquid Membrane Forming Compounds for Curing Concrete
 17. C330 Standard specifications for Lightweight Aggregates for Structural Concrete
 18. C340 Standard Specifications for Portland-Pozzolan Cement
 19. C494 Specification for Chemical Admixtures for Concrete
 20. C618 Standard Specifications for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
 21. C827 "Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
 22. C845 Standard Specifications for Expansive Hydraulic Cement
 23. C989 Specification for Ground Iron Blast-Furnace Slag for Use in Concrete and Mortars
 24. C1017 Standard Specifications for Chemical Admixtures for Use in Producing flowing Concrete
 25. C1064 Test Method for Temperature of Freshly Mixed Portland-Cement Concrete
 26. C1107: Specification for Packaged Dry, hydraulic Cement Grout (Non-Shrink)
 27. C1157 Standard Performance Specifications for Silica Fume in Cementitious Mixtures
 28. C1240 Standard Specification for Silica Fume for Use in Hydraulic-Cement Concrete
 29. D1751: Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 30. E154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
- D. Federal Specifications (Fed. Spec.):
1. TT-S-00230: Sealing Compound: Elastomeric Type, Single Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures)

1.4 DESIGN REQUIREMENTS

- A. Codes: Building concrete shall be in conformance with the requirements of ACI 318, and the Rhode Island State Building Code.
- B. Coordinate use of curing compounds with the floor coatings.
- C. Air-entrain all exterior exposed concrete.

1.5 SUBMITTALS

- A. Product Data: Submit design mix including color additives as applicable. Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, synthetic fibers, admixtures, color additives, patching compounds, waterstops, joint systems, curing compound, and others as requested by the Engineer.
- B. Shop Drawings: Submittals included in the Section shall be in accordance with the requirements specified. Submit Working drawings for all Work under this Section to the Engineer for approval. Show location of joints, concrete pouring sequence, schedule dates, rate of placement and methods. All concrete mix designs shall conform to ACI-318, Chapter 5 and as specified. All concrete mix designs and concrete material tests shall be signed and sealed by a Professional Engineer in the State of Rhode Island.

- C. Samples: Submit samples of materials as specified, including names, sources and descriptions.
- D. Laboratory Test Reports: Submit laboratory test reports for concrete, concrete materials, and mix design tests.
- E. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.
- F. Submit prior to start of Work written reports of each proposed mix for each class of concrete. Do not begin concrete production until mixes have been approved by the Engineer.
- G. Batch Ticket Information: Provide concrete delivery tickets showing job name and location, date and time of delivery, quantity of concrete, quality and type of concrete, admixtures, amount of water added, and all other relevant information as described in ASTM C-94. Submit original batch tickets and 2 copies at the end of each week.
- H. Provide a plan with dimensions indicating location of expansion and control joints for all site work concrete.

1.6 QUALITY ASSURANCE

- A. Provide in accordance with the requirements as specified.
- B. Concrete Testing Service: The Contractor shall employ and pay an independent testing laboratory to perform material evaluation tests and to design concrete mixes and provide copies of recently made material tests and mix designs.
- C. Materials and installed Work may require testing and retesting at anytime during progress of Work. Allow free access to material stockpiles and facilities. All tests, including retesting of rejected materials and installed Work, shall be done at Contractor's expense.
- D. Workmanship: The Contractor is responsible for correction of corrected Work that does not conform to the specified requirements, including strength, tolerances and finishes. Correct deficient concrete as directed at no additional cost to the Owner.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Order concrete from batching plant so that trucks arrive at discharge locations when concrete is required. Avoid excessive mixing of concrete or delays in placing successive layers of concrete in forms.
- B. Deliver concrete to discharge locations in watertight agitator or mixer trucks without altering the water-cement ratio, slump, air entrainment, temperature and homogeneity.
- C. Concrete not conforming to specification, unsuitable for placement, exceeding the time or temperature limitations or not having a complete delivery batch ticket will be rejected.

1.8 JOBSITE CONDITIONS

- A. Weather: Protect concrete from damage and reduced strength or performance due to weather extremes during mixing, placing and curing.

- B. Cold Weather: Unless special precautions are taken to protect concrete, do not Work when temperatures are below 40°F or when temperatures are expected to fall below 40°F within 72 hours after placing concrete.
1. Comply with ACI 306 in cold weather.
 2. Maintain concrete temperature of at least 60°F. Reinforcement, forms and ground in contact with concrete shall be free of frost.
 3. Keep concrete and formwork at least 50°F for at least 96 hours after placing concrete.
 4. The use of calcium chloride in any form is not permitted. Non-chloride accelerator shall be used when ambient temperature is below 50°F.
 5. Admixture manufacturer shall provide technical assistance at no additional cost. A manufacturer's representative shall be available for consultation by phone or on site upon 72-hour notice.
- C. Hot Weather: Concrete, when deposited, shall be less than 85°F. Cool the mix in a manner acceptable to the Engineer if the concrete temperature is higher.
1. Comply with ACI 305 in hot weather.
 2. Retarder shall be used when ambient temperature exceeds 80°F.
- D. Schedule delivery of colored concrete to provide consistent mix times from batching until discharge.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type II for all Work unless otherwise specified. Use one brand of cement throughout project.
- B. Normal Weight Aggregates: ASTM C 33, and as herein specified. Use ¾" maximum size for all concrete. Provide aggregates from a single source for exposed concrete.
- C. Water: Clean, potable and free from foreign materials such as oils, acids, alkalis, and organic materials in amounts harmful to concrete and embedded steel. Provide water which meets ACI/ASTM requirements for concrete mix water.
- D. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include the following
 - a. "Air-Mix"; Euclid Chemical Co.
 - b. Sika Aer"; Sika Corp.
 - c. "MB-VR or MB-AE"; Master Builders
 - d. "Darex AEA" or "Daravair"; W.R. Grace
 - e. Or equal.
- E. Water Reducing Admixture: ASTM C 494, Type A, and containing not more than 0.1% chloride ions. Follow manufacturer's recommendations for amount of admixture to be added to the concrete. Admixture shall be compatible with air-entraining admixtures.
1. "WRDA Hycol"; W. R. Grace.
 2. "Eucon WR-75"; Euclid Chemical Co.
 3. "Pozzolith Normal" Master Builders
 4. "Plastocrete 160"; Sika Chemical Corp.
 5. Or equal.

- F. High-Range Water Reducing Admixture (SuperPlasticizer): ASTM C 494, Type F or Type G and containing not more than 0.1% chloride ions. Follow manufacturer's recommendations.
1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include the following:
 - a. "WRDA 10" or "Daracem"; W. R. Grace.
 - b. "PSP"; Protex Industries Inc.
 - c. "Super P"; Anit-Hydro.
 - d. "Sikament"; Sika Chemical Corp.
 - e. "Rheobuild"; Master Builders.
 - f. Or equal.
- G. Water Reducing, Non-Chloride Accelerator Admixture: ASTM C 494, Type E or C, and containing not more than 0.1% chloride ions.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Accelguard 80"; Euclid Chemical Co.
 - b. "Pozzutec 20"; Master Builders, Inc.
 - c. "PolarSet"; Grace Construction Products.
 - d. Or equal.
- H. Water Reducing, Retarding Admixture: ASTM C 494 Type D, and containing not more than 0.1% chloride ions.
1. Products: Subject to compliance with requirements, products that may be incorporated in the Work include the following:
 - a. "Edoco 20006"; Edoco Technical Products.
 - b. "Pozzolith Retarder"; Master Builders.
 - c. "Eucon Retarder 75"; Euclid Chemical Co.
 - d. "Daratard"; W. R. Grace.
 - e. "Plastiment"; Sika Chemical Co.
 - f. Or equal.
- I. Prohibited Admixtures: Calcium chloride thycyanates or admixtures containing more than 0.1% chloride ions are not permitted.

2.2 RELATED MATERIALS

- A. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gauge galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- B. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. Per sq. yd., complying with AASHTO M 182, Class 2.
- C. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
1. Waterproof paper.
 2. Polyethylene film.
 3. Polyethylene-coated burlap.
- D. Joint Sealants shall be provided in color to match color of concrete.
- E. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal.
1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
 - a. "Masterseal"; Master Builders.

- b. "A-H 3 Way Sealer"; Anti-Hydro Waterproofing Co.
 - c. "Ecocure"; Euclid Chemical Co.
 - d. "Clear Seal"; A.C. Horn, Inc.
 - e. "Sealco 309"; Gifford-Hill/American Admixtures.
 - f. "J-20 Acrylic Cure"; Dayton Superior.
- F. Underlayment Compound: Free flowing, self-leveling, pumpable cementitious base compound.
- 1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
 - a. "Ardex K-15"; Ardex Engineered Cements.
 - b. "Silflo 200"; Silpro Masonry Systems.
 - c. "Ultra/Plan"; Mapei.
- G. Bonding Compound: Polyvinyl acetate or acrylic base.
- 1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
 - a. Acrylic or Styrene Butadiene:
 - 1) "J-40 Bonding Agent"; Dayton Superior Corp.
 - 2) "Everbond"; L & M Construction Chemicals.
 - 3) "Hornweld"; A. C. Horn, Inc.
 - 4) "Daraweld C"; W. R. Grace.
- H. Adjustable inserts: Adjustable inserts shall be hot-dip galvanized in conformance with ASTM A123 and A153. Adjustable insets shall be:
- 1. Ductile iron wedges inserts, Type F-7 manufactured by Dayton Sure-Grip & Shore Co.
 - 2. Malleable iron peerless wedge inserts, insert as manufactured by Richmond Screw, Anchor Co., Inc.
 - 3. Malleable iron wedge inserts, Type HW as manufactured by Hohmann & Barnard Inc.

2.3 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to the Engineer for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.
- B. Submit written reports for review of design mix for specified strength of concrete within 15 days prior to start of Work. Do not begin concrete production until mixes have been reviewed.
- C. Strength: Provide concrete having the following minimum compressive strength at 28 days:
 - 1. Class 4000 – 3/4" normal weight concrete: Typical, unless noted otherwise.

The concrete quality, mixing and placing shall conform to ACI-318, Chapter 5.

Design mixes to provide **normal weight concrete** with the following properties, as indicated:

| Minimum Design Compressive Strength | Minimum Strength fc 7 days | Laboratory Testing Age 28 day | Minimum ** Cement Content/cu.yd. | Maximum* W/C Ratio |
|-------------------------------------|----------------------------|-------------------------------|----------------------------------|--------------------|
| 4,000 (3/4") psi | 2,400 psi | 4,000 psi | 565 | .45 |

*Maximum: Decrease if possible

**Minimum: Increase as necessary to meet all other stated requirements.

- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by the Engineer. Laboratory test data

for revised mix design and strength results must be submitted to and accepted by the Engineer before using in Work.

E. Admixtures:

1. Use water-reducing admixture or high range water reducing admixture (super plasticizer) in all concrete in strict accordance with the manufacturer's printed instructions.
2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50°F in strict accordance with the manufacturer's printed instructions.
3. Use high-range water-reducing admixture in pumped concrete required to be watertight, and concrete with water/cement ratios below 0.40.
4. Use air-entraining admixture in all concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content as follows:
 - a. $\frac{3}{4}$ " aggregate normal weight concrete: 6.0% with a tolerance of $\pm 1\%$

F. Consistency:

1. The consistency shall be uniformly maintained within the allowable range of slump for the job materials. Ordinarily the slump shall not be less than 1-1/2" inch nor more than 4 inches, unless in the opinion of the Engineer, job conditions warrant exceeding these limits. The consistency shall be determined by the AASHTO Method T-119. This range of slump is to be maintained for all concrete including pumped concrete.
2. Concrete containing HRWR admixture (super-plasticizer): Not more than 7" after addition of HRWR to site-verified 1-1/2" to 4" slump concrete.
3. Ramps, slabs and sloping surfaces: Not more than 3 inches.
4. Reinforced foundation systems: Not less than 1-1/2" inch nor more than 4 inches.

2.4 CONCRETE MIXING

A. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to the batch will not be permitted.

1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required. When air temperature is between 85°F (30° C) and 90°F (32° C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes.
2. During cold weather heat water, sand and cement materials per recommendations of ACI 306.

B. High Early Strength Concrete: Follow manufacture's product specific installation guidelines. Cement shall be added to a pre-measured amount of water that does not exceed the manufacturer's maximum recommended water content. Material can be extended up to 60% using pea gravel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Batch, mix and deliver Portland cement concrete in conformance with ASTM 94. Batch all constituents at central batching or mixing plant. Produce concrete in conformance with ACI 301 and as specified.

B. Seasonal Conditions:

1. Conform to ACI 305R and as specified for hot weather concreting. Do not add retarder admixture to any concrete.
2. Conform to ACI 306R and as specified for cold weather concreting. Do not add accelerator admixture to any concrete.

3.2 INSTALLATION OF EMBEDDED ITEMS

- A. Set and build into Work, anchorage devices and other embedded items required for other Work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.
- B. Clean embedded items of oil, ice, dirt and all other foreign items.
- C. For embedded pipes, complete all necessary testing requirements prior to placing concrete.

3.3 PLACING CONCRETE

A. General:

1. Concrete formwork shall satisfy the requirements of Section 03 11 00, Concrete Formwork. Do not place concrete until the depth, character and adequacy of forms, falsework, embedments, and the placing of the steel reinforcement have been approved by the Engineer. The method and manner of placing the concrete shall be such as to avoid segregation of aggregate and displacement of the reinforcement. Troughs, pipes and chutes may be used as aids in placing concrete when necessary. Dropping the concrete a distance of more than five feet, or depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon clean, damp surfaces, free from running water, or upon properly consolidated soil.
2. Retempering of concrete by adding water or any other material shall not be permitted.
3. Concrete placement, finishing and curing, and all other pertinent construction practices shall be in accordance with ACI 117 and ACI 301. In addition to the requirements of ACI 117 and ACI 301, the following shall apply:
 - a. Concrete shall be placed so that a uniform appearance of surfaces will be obtained.
 - b. Concrete shall be placed and consolidated free of rock pockets, honeycombs, and voids.
 - c. Concrete shall be deposited as nearly as practicable in its final position, to avoid segregation due to rehandling or flowing, and shall not be subjected to any procedure that will cause segregation.
 - d. Concrete shall be placed and consolidated in walls in approximately 18-inch layers, proceeding at a uniform rate or per the form designer's recommendation.
 - e. Subgrade shall be slightly moist when the concrete is placed for floor slabs, to prevent excessive loss of water from the concrete mix.

B. Consolidating:

1. Consolidate concrete with suitable mechanical vibrators operating within concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate consolidation. Vibrators shall be manipulated so as to Work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any joint shall be of sufficient duration to accomplish consolidation but shall not be prolonged to the point where segregation occurs.
2. Employ as many vibrators and tampers as necessary to secure the desired results. For every two vibrators required for the job, an additional standby vibrator shall be kept on the site. Do not place subsequent layers of concrete until the previous layer has been consolidated as specified. Internal vibrators shall have a minimum frequency of 8000

- vibrations per minute when immersed in concrete and shall have sufficient amplitude to effectively consolidate the concrete.
3. Prevent the following practices:
 - a. Pushing of concrete with vibrator.
 - b. External vibration of forms.
 - c. Allowing vibrator to vibrate against reinforcing steel where steel projects into green concrete.
 - d. Allowing vibrator to vibrate against the contact faces of forms.
- C. Cold Weather: Do not place concrete when the ambient temperature is below 40°F, unless specifically authorized by the Engineer. Conform to the requirements of ACI 306R during cold weather.
- D. Hot Weather: Do not place concrete with a mix temperature exceeding 90°F, unless specifically authorized by the Engineer. Conform to the requirements of ACI 305R during hot weather.
- E. Construction Joints:
 1. When the placing of concrete is suspended, necessary provisions shall be made for joining future Work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys, dovetails, reinforcing bars or other devices as may be prescribed. Before depositing new concrete against concrete which has hardened, the surface of the hardened concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a neat coating of cement paste or grout. Install joint sealant where shown on the Drawings, in accordance with manufacturer's instructions.
 2. Joints shall be perpendicular to the main reinforcement.
 3. Construction joints in floors shall be located within the middle third spans of slabs, beams, and girders.
- F. Expansion and Control Joints: Expansion and control joints shall be constructed in the locations and to the dimensions and details shown on the Drawings.
- G. Defective Work:
 1. All defective Work disclosed after the forms have been removed shall be immediately removed and replaced. If dimensions are deficient, or if the surface of the concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Engineer cannot be repaired satisfactorily, the entire Section shall be removed and replaced at no cost to the Owner.
 2. Other Work considered to be defective includes, but is not limited to, the following:
 - a. Concrete in which defective or inadequate steel reinforcement has been placed.
 - b. Concrete incorrectly formed, or not conforming to details and dimensions on the Drawings or with the intent of these documents, or the concrete surfaces of which are out of plumb or level beyond specified tolerances.
 - c. Concrete below specified strength.
 - d. Concrete containing wood, cloth, or other foreign matter, rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the Drawings.
- 3.4 CONCRETE FINISHING
- A. Exposed concrete surfaces shall be true, smooth, and free from open or rough spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought flush with the finished top surface at the proper elevation and shall be struck off with a straightedge and floated. Mortar finishing will not be permitted, nor shall dry cement or sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.

- B. Following placement of concrete for slabs and floors, tamp to force coarse aggregate away from surface, bull float, and steel trowel. Floor areas designated to receive a floor coating shall receive a finish as recommended by the coating manufacturer. Steel trowel finish shall be provided for surfaces that will receive flooring and all exposed floor areas.
- C. Overall conformance to design grade shall be within $\frac{3}{4}$ " of design elevation.
- D. The following requirements shall govern concrete finishes so indicated on the Drawings.
1. Float Finish: Force coarse aggregate away from surface; float to a smooth and even surface.
 2. Trowel Finish:
 - a. After floating, begin the first trowel finish operation using a power-driven trowel; begin final troweling when the surface produces a ringing sound as the trowel is moved over the surface.
 - b. Do not over-trowel or start troweling late.
 - c. Consolidate the concrete surface by the final hand troweling operation, free from trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding $\frac{1}{8}$ " in 10'-0" when tested with a 10'-0" straight-edge.
 3. Apply nonslip broom finish to exterior concrete as specified, immediately after trowel finishing; roughen the concrete surface by brooming in the direction perpendicular to the main traffic route.
 - a. Use a fiber bristle broom.
 - b. Frequently clean broom to avoid deep brooming.
 4. Finishing Formed Surface:
 - a. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or Concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding $\frac{1}{4}$ inch in height rubbed down or chipped off.
 - b. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projects, completely removed and smoothed.
 - c. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces that have received smooth-formed finish treatment not later than one (1) day after form removal.
 - 1) Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - d. Grout-Cleaned Finish: Provide grout-cleaned finish on scheduled concrete surfaces that have received smooth-formed finish treatment.
 - 1) Combine one part Portland Cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard Portland Cement and white Portland Cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.
 - 2) Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least thirty-six (36) hours after rubbing.
 - e. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a

texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent uniformed surfaces unless otherwise indicated.

E. Monolithic Slab Finishes

1. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.
 - a. After placing slabs, finish surface to tolerances of F(F) 15 (floor flatness) and F(L) 13 (floor levelness) measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
2. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.
 - a. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(F) 18 (floor flatness) and F(L) 15 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
3. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or thinset quarry tile, paint, or another thin film-finish coating system.
 - a. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 25 (floor flatness) and F(L) 20 (Floor levelness) measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.
4. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately flow by slightly scarifying the surface with a fine broom.
5. Non-slip Broom Finish: Apply a non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - a. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
6. Non-slip Aggregate Finish: Apply non-slip aggregate finish to concrete stair treads, platforms, ramps, sloped walks.
 - a. After completing float finishing and before starting trowel finish, uniformly spread 25 lbs. Of dampened non-slip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as specified.
 - b. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose non-slip aggregate.

3.5 CURING AND PROTECTION

- A. Initial Curing: All concrete shall be properly cured and protected in accordance with ACI 308. Maintain concrete above 50 degrees F during first seven days after placing. The Work shall be protected from the elements, flowing water, and from defacement of any nature, during construction. The concrete shall be cured as soon as it has sufficiently hardened, by covering

with an approved material. Water-absorptive coverings shall be thoroughly saturated when placed, and kept saturated for a period of at least seven days. Curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to air currents. Where wooden forms are used, they shall be kept wet at all time until removed, to prevent the opening of joints and drying out of the concrete. Membrane curing compounds shall be coordinated with the surface to be painted, covered with plaster, covered with sealer, and other surfaces which curing compound would adversely affect subsequent construction.

- B. Duration of Curing: The final curing shall continue until the cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the air in contact with the concrete is above 50°F, has totaled 7 days beyond the initial curing period.
 - 1. If high-early strength concrete has been used, the final curing shall continue for a total of 3 days beyond the initial curing period.
 - 2. Rapid drying at the end of the curing period shall be prevented.
- C. Formed Surfaces: Steel forms heated by the sun and all wood forms in contact with the concrete during the curing period shall be kept wet.
 - 1. If forms are to be removed during the curing period, one of the specified curing materials or methods shall be employed immediately.
 - 2. Such curing shall be continued for the remainder of the curing period.

3.6 CONCRETE SURFACE REPAIRS

- A. General: Any defective Work disclosed after removal of forms shall be immediately removed and replaced. If in the opinion of the Engineer, the surface of the concrete cannot be repaired satisfactorily, the entire Section shall be removed and replaced at not additional expense to the Owner.
- B. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to the Engineer.
 - 1. Cut out honeycomb, rock pockets, voids over 1" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.
- C. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- D. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to the satisfaction of the Engineer. Surface defects, as such, include color and texture irregularities, bulges, uneven surfaces, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.
- E. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- F. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic labs, for smoothness and verify surface plane to tolerances specified for each surface and finish.

Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.

- G. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least ¾" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- H. Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Groove top of cracks and cutout holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
- I. Perform structural repairs with prior approval of the Engineer for method and procedure, using specified epoxy adhesive and mortar.
- J. Repair methods not specified above may be used, subject to acceptance of the Engineer.

3.7 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. Program of Structural Test and Inspections of cast-in-place concrete work will be established by the Structural Engineer of Record (SER) who will direct the implementation of tests as carried out by an Independent Testing Agency, under a separate contract with the Owner. Materials and workmanship shall be subjected to inspection and testing in mill, shop, and/or field by the SER and/or Testing Agency. Such inspection and testing shall not relieve the Contractor of his responsibility to provide his own inspection, testing, and quality control as necessary to furnish materials and workmanship in accordance with requirements of Contract Documents.
- B. The General Contractor shall notify the SER and the Testing Agency prior to start of any phase of concrete work so as to afford them reasonable opportunity to inspect the work. Such notification shall be made at least 24 hours in advance.
- C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - 1. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - 2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - 3. Concrete Temperature: Test hourly when air temperature is 40°F and when 80°F and above; and each time a set of compression test specimens are required.
 - 4. Compressive Strength Tests: ASTM C39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 - a. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches if fewer than 5 are used.
 - b. When total quantity of a given class of concrete is less than 50 cu. yds, strength test may be waived by the Engineer if, in his judgment, adequate evidence of satisfactory strength is provided.

- c. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 - d. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength, and no individual strength test results falls below specified compressive strength by more than 500 psi.
- D. Test results will be reported in writing to the Engineer and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name and location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- F. Additional Tests: The Contractor's Independent testing service shall make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Engineer. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed.

END OF SECTION

Division 04 through Division 30 – Not Used

Division 31 – Earthwork

SECTION 310000

EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. All work specified in this Section shall conform to "Standard Specifications for Road and Bridge Construction" of the Rhode Island Department of Transportation, latest revision, herein referred to as "State Standards".

1.3 SUMMARY

- A. This Section includes all excavation including, but not limited to, the following:
 - 1. Excavating and backfilling for demolition of buildings and structures.
 - 2. Excavating and backfilling for utility trenches.
 - 3. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
 - 4. Geotextiles
- B. Related Sections include:
 - 1. Section 315000 Excavation Support and Protection
 - 2. Section 312319 Dewatering

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Geotextiles
 - 2. Provide a 12-by-12-inch sample of geotextiles and the manufacturer's recommended installation procedure.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance with the following requirements indicated:
 - 1. Gradation Test Results for each on-site and imported soil material proposed for fill and backfill.
 - 2. Laboratory compaction curve according to ASTM D 6938 ASTM D 1557 for each on-site and imported soil material proposed for fill and backfill.
 - 3. Each submittal shall include the intended use for the material with the appropriate specification section and material name corresponding to the Contract Documents to facilitate review.
 - 4. Tree Box Filter soil mix
 - 5. Bioretention soil mix

- C. Copies of permits obtained for excavations that are required by state and local governing authorities and local utility companies shall be submitted to the owner's representative.
- D. Pre-Blast Survey Report prepared by a Professional Engineer registered in the State of Rhode Island. Include photo documentation.

1.5 SITE INFORMATION

- A. It is hereby understood that the Contractor has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.
- B. Plans, surveys, measurements and dimensions, under which the work is to be performed, are believed to be correct to the best of the Engineer's knowledge, but the Contractor shall have examined them for himself during the bidding period, as no allowance will be made for any errors or inaccuracies that may be found herein.
- C. Data on indicated subsurface conditions are not intended as representations or warrants of continuity of such conditions between soil borings. It is expressly understood that the Owner and Engineer will not be responsible for interpretations or conclusions drawn there from by the Contractor.
- D. The Contractor may request to perform additional test borings and other explorations at no cost to the Owner.
- E. Soil borings and test pits have been made by qualified Contractors prior to this Contract. This information shall be made available to bidders as specified under other Sections. The Contractor is responsible to employ qualified personnel capable of interpreting geotechnical information, test pit logs, and boring logs. The results of these subsurface explorations and recommendations for work were prepared by the Engineer, consulting geotechnical engineers, and are hereby attached to this specification for information only. Procedures for dewatering, areas to receive special fill and other methods and procedures specified herein shall be supplemented by this information. For purposes of this specification, this information will be referred to as the Geotechnical Report. Where procedures within the report vary from procedures as specified herein, this specification shall override. The Geotechnical Report is available as a separate document.
- F. The Geotechnical Report states that rock is present on the site. The costs of additional rock excavation resulting from changes in the work shall be paid for as outlined in the measurement and payment section of this specification.
- G. The Geotechnical Report states that groundwater is present on the site. The groundwater has been observed over the last few months above the elevations included in the Geotechnical Report. The Contractor is made aware of this condition and will not be eligible to receive additional compensation for dewatering exceeding the Contractor's initial bid.
- H. The Geotechnical Report states that some of the materials present on site contain quantities of silt beyond the limit deemed acceptable for re-use by this specification. The Contractor is made aware of this condition and will not be eligible to receive additional compensation for imported material exceeding the Contractor's initial bid.
- I. The Geotechnical Report states that Fill material present on-site contains brick, debris, or quantities of silt that may limit re-use of this material. The Geotechnical Report allows the Contractor to conduct testing at his own expense to confirm whether this material is suitable for

re-use. The Contractor is made aware of this condition and will not be eligible to receive additional compensation for imported material exceeding the Contractor's initial bid.

- J. It is the responsibility of the Contractor under this Contract to do the necessary excavation, filling, grading, and rough grading to bring the existing grades to subgrade and parallel to finished grades as specified herein and as shown on the Drawings for this Work. The Contractor shall visit the site prior to submitting a bid to become familiar with the extent of the work to be done under this Contract. The Contractor shall be responsible for determining the quantities of earth materials that must be imported or hauled off the site necessary to complete the work under this Section. All imported earth materials required to construct the project shall be included in the Contractor's base bid.
- K. The Contractor is allowed to re-use excavated On-Site Common Borrow as fill in accordance with this specification. All On-Site Common Borrow used as backfill shall be compacted to the required percentage of maximum dry density included in Table 2 below.
 - 1. The Contractor is made aware that On-Site Common Borrow may contain large amounts of silt. Additional efforts required to reuse On-Site Common Borrow are the responsibility of the Contractor and shall result in no additional expense to the Owner or a request for additional time for delays caused by its usage.
 - 2. The Contractor agrees to use this material at his own risk and is responsible for any additional work required to install this material in accordance with the specifications.
 - 3. If project delays will result from the additional time required to re-work On-Site Common Borrow, placed as fill in accordance with the specifications, the Contractor shall remove material that does not meet the compaction requirements and provide imported fill meeting the specifications. This imported material shall be provided at no additional expense to the Owner.
 - 4. Any project delays resulting from additional time required to work this material are the responsibility of the Contractor.
- L. The Contractor shall use suitable on-site soils and fill, and soil from off-site sources, as needed. Please note that not all on-site materials will be suitable for reuse, nor will all required material gradations be present on the site. Imported materials are anticipated for this project.
- M. Contractor shall protect and adjust moisture condition of all on-site and imported materials for proper installation, compaction, and use. This includes covering, drying, and adding moisture as required to maintain suitable workability of the soil materials. Please note onsite and imported materials will not necessarily be encountered, or delivered in a suitable condition as environmental factors prevalent at the time of construction will impact soil materials.

1.6 DEFINITIONS

- A. Backfill: Soil material used for fill and excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Course placed between the subbase course and asphalt paving.
- C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow: Satisfactory soil for use as fill or backfill.
- E. Boulder: A soil particle with a minimum dimension of 12 inches.

- F. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- G. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated on the Drawings.
1. Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Owner's Representative.
 2. Bulk Excavation: Excavation more than 6 feet in width and more than 10 feet in length for the installation of utilities, foundations, and footings.
 3. Trench Excavation: Excavation 6 feet in width or less for the installation of utilities, foundations, and footings
 4. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Owner's Representative. Unauthorized excavation, as well as remedial work directed by Owner's Representative, shall be without additional compensation.
- H. Fill: Soil materials used to raise existing grades.
- I. Imported Material: Material obtained by the Contractor from sources off the site.
- J. Influence Area: The area within planes sloped downward and outward at an angle of 60 degrees from the horizontal from (a) 1 foot outside the outermost edge at the base of foundations or slabs; or (b) 1 foot outside the outermost edge at the surface of roadways or shoulder; or (c) 0.5 foot outside the exterior edge at the spring line of pipes and culverts.
- K. Optimum Moisture Content: Determined by the ASTM standard specified to determine the maximum dry density for relative compaction.
- L. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D1557. Corrections for oversize material may be applied to either the as-compacted field dry density or the maximum dry density, as determined by the Owner's Representative.
- M. Relative Density: As defined by ASTM D4253 or D4254.
- N. Rock material in beds, ledges, unstratified masses, conglomerate deposits that cannot be removed, in the opinion of the Engineer, without systematic drilling, ram hammering, blasting, or ripping. Weathered Rock that can be removed by an excavator without hammering or other mechanical means shall not meet the definition of rock.
- Rock also includes boulders of rock material that exceed 2 cu. yd. for bulk excavation or 1 cu. yd. diameter for footing, trench, and pit excavation.
1. Bulk Rock Excavation: Rock encountered within bulk excavation as defined above.
 2. Trench Rock Excavation: Rock encountered within trench excavation as defined above.
- O. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- P. Subbase Course: Course placed between the subgrade and base course for asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or asphalt walk.
- Q. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

- R. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch in diameter; and free of weeds, roots, and toxic and other non-soil materials.
- S. Unsuitable Soils: Existing soils that, in the opinion of the Engineer and Owner's Representative, are unsuitable to remain in their existing location that are deposited outside the excavation limits. This does not include topsoil, subsoil, and silty-sand materials.
 - 1. Anticipated unsuitable soils: Unsuitable soils identified in the geotechnical report, drawings, specifications, test pit logs, or boring logs provided as part of the project manual.
 - 2. Unanticipated unsuitable soils: Unsuitable soils not identified in either the geotechnical report, test pits, or boring logs provided as part of the project manual.
- T. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
- U. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes. Well-graded does not define any numerical value that must be placed on the coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters. Well-graded is used to define a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.

1.7 IMPORTED MATERIAL ACCEPTANCE

- A. All imported earth materials specified in this section are subject to the following requirements:
 - 1. Materials imported to the site by the Contractor for on-site use shall not contain oil and/or hazardous materials.
 - 2. All tests necessary for the Contractor to locate acceptable sources of imported material shall be made by the Contractor. Certification that the material conforms to the Specification requirements along with copies of the test results from a qualified commercial testing laboratory shall be submitted to the Engineer for approval at least 5 calendar days before the material is required for use. All material samples shall be a minimum of 40 pounds and furnished by the Contractor at the Contractor's sole expense. Samples shall be representative and be clearly marked to show the source of the material and the intended use on the project. Sampling of the material source shall be done by the Contractor in accordance with ASTM D75. Tentative acceptance of the material shall be based on an inspection of the source by the Engineer and/or the certified test results submitted by the Contractor to the Engineer at the Engineer's discretion. No imported materials shall be delivered to the site until the proposed source and the Engineer has tentatively accepted materials tests in writing. Final acceptance will be based on Quality Control and Quality Assurance tests made on samples of material taken from the completed and compacted course.
 - 3. Gradation tests by the Contractor shall be made on samples taken at the place of production prior to shipment. Samples of the finished product for gradation testing shall be taken as specified in 3.16 FIELD QUALITY CONTROL, or more often as directed by the Owner's Representative if variation in gradation is occurring, or if the material appears to depart from the Specifications. Test results shall be forwarded to the Engineer within 48 hours of testing.
 - 4. If tests conducted by the Contractor or the Engineer, indicate that the material does not meet Specification requirements; material placement will be terminated until corrective measures are taken. Material that does not conform to the Specification requirements and is placed in the work shall be removed and replaced at the Contractor's sole expense. Retesting of material that does not meet specification requirements shall be performed at the Contractor's sole expense.

1.8 QUALITY ASSURANCE

- A. Employ a qualified surveyor, registered with the State of Rhode Island as a Professional Land Surveyor, as required for all layout and to establish grades for the work being performed.
 - 1. Prior to commencing work, Contractor's surveyor shall perform a benchmark level verification to confirm vertical and horizontal control of the site. Notify Owner and Owner's Representative prior to commencing work if discrepancies are found.
- B. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 543-15 shall be hired to provide required testing of earthwork materials at the Contractor's Expense.
- C. All temporary shoring and bracing shall be designed, detailed, and stamped by a Professional Engineer registered in the State of Rhode Island. Refer to SECTION 31 50 00 - EXCAVATION SUPPORT AND PROTECTION
- D. Pre-excavation Conference: Conduct conference at Project site prior to the start of construction. Date and time to be specified by the Owner's Representative.

1.9 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services according to requirements indicated.
 - 1. Notify Owner and Architect not less than two weeks in advance of proposed utility interruptions in writing. Renotify 72 hours in advance of proposed utility interruptions.
 - a. Notifications should be made to the Owner's Representative.
 - b. Do not proceed with utility interruptions without Owner's written permission.
 - c. All power shutdowns shall be coordinated with the Owner.
 - 2. Contact "Dig Safe" at 1-888-Dig Safe to verify locations of existing underground utilities in areas of proposed excavation prior to commencing any excavation effort.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed on the Drawings. Coordinate with utility companies to shut off services if lines are active.

1.10 EXCAVATION SAFETY

- A. The Contractor shall be solely responsible for making all excavations in a safe manner. Contractor shall comply with all Local and State OSHA requirements.
- B. Provide appropriate measures to attain a stable base, retain excavation side slopes and prevent earth slides to ensure that persons working in or near the excavation are protected.

1.11 LAYOUTS AND GRADES

- A. All line and grade work not presently established at the site shall be laid out by a survey team under the supervision of a Registered Land Surveyor or Professional Engineer employed by the Contractor in accordance with Drawings and Specifications. The Contractor shall supply all additional layout and grade control as necessary to properly implement and construct the work. The Contractor shall establish permanent benchmarks and replace as directed any which are destroyed or disturbed.

- B. The words "finished grades" as used herein shall mean final grade elevations indicated on the Drawings. Spot elevations shall govern over proposed contours. Where not otherwise indicated, project site areas outside of the building shall be given uniform slopes between points for which finished grades are indicated or between such points and existing established grades.

1.12 TOLERANCES

- A. All material limits shall be constructed within a vertical tolerance of 0.1 foot and a horizontal tolerance of 1 foot except where dimensions or grades are shown or specified as minimum. All grading shall be performed to maintain slopes and drainage as shown. No reverse slopes will be permitted.

1.13 DRAINAGE

- A. The Contractor shall control the grading in areas under construction on the site so that the surface of the ground will properly slope to prevent accumulation of water in excavated areas and adjacent properties.
- B. The Contractor shall excavate interceptor swales and ditches where necessary prior to the start of major earthmoving operations to insure minimal erosion and to keep areas as free from surface water as possible.
- C. Should surface, rain, or ground water be encountered during the operations, the Contractor shall furnish and operate pumps or other equipment, and provide all necessary piping to keep all excavations clear of water at all times and shall be responsible for any damage to work or adjacent properties for such water. All piping exposed above ground surface for this use, shall be properly covered to allow foot traffic and vehicles to pass without obstruction.
- D. Presence of ground water in soil will not constitute a condition for which an increase in the contract price may be made. Under no circumstances place concrete fill, lay piping, or install appurtenances in excavation containing free water. Keep utility trenches free of water until pipe joint material has hardened and backfilled to prevent flotation.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: The Contractor may reuse excavated on-site material for fill and backfilling where the material excavated is satisfactory and conforms with the below specified gradation requirements. The Contractor is to provide imported soil materials with satisfactory properties conforming with the below specified gradation requirements when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soils being free of rock or gravel larger than 3 inches in any dimension, debris, broken pavement, waste, frozen materials, vegetation, and other deleterious matter and conform to the criteria listed below:
- C.
 1. Gradations of satisfactory soils are as shown in the Table below:

| SOIL GRADATIONS | | | | | |
|-----------------|------------------|---------------|--------------------------|------------------------|-------------|
| Sieve Size | Sand Gravel Fill | Granular Fill | 1-1/2 inch Crushed Stone | 3/4 inch Crushed Stone | Coarse Sand |
| 3-inch* | 100 | 60-100 | - | - | - |
| 1-1/2-inch* | 70-100 | - | 85-100 | 100 | - |
| 3/4-inch | 50-85 | - | 10-40 | 90-100 | - |
| 1/2-inch | - | 50-85 | 0-8 | 10-50 | - |
| 3/8-inch | - | 45-80 | - | - | 100 |
| No. 4 | 30-55 | 40-75 | - | 0-5 | 95-100 |
| No. 10 | - | - | - | - | 50-85 |
| No. 40 | - | 0-45 | - | - | - |
| No. 50 | 8-25 | - | - | - | 2-10 |
| No. 200 | 0-8 | 0-10 | <1 | <1 | - |

* The maximum recommended stone size is three inches where placed as base course below slabs and pavement; elsewhere, maximum stone size shall be 2/3 of the loose lift thickness.

2. Common Borrow shall be imported or excavated onsite material free of roots, sod, rubbish, debris, frozen materials, broken pavement, or other deleterious or organic matter, and conform to the following requirements.
 - a. Imported Common Borrow shall conform to the specified gradation of Granular Fill in Table 1.
 - b. Onsite Common Borrow shall conform to the specified gradation of Granular Fill in Table 1, but may contain no more than 15-percent by weight passing the No. 200 sieve. Onsite Common Borrow shall not be placed as foundation wall backfill, as pavement base or subbase courses, as retaining wall backfill, or locations where free-draining backfill are required.
 - c. Stones from excavated onsite material retained on a 3-inch sieve, less than 6-inches in diameter, and not exceeding two-thirds of the thickness of the horizontal layers placed after compaction can be placed for construction. Materials meeting these criteria shall not be included in the analysis for gradation. Materials exceeding this size shall not be placed in backfill below paved areas.
3. Subbase Material shall be free of rock or gravel larger than 3 inches in any dimension, debris, broken pavement, waste, frozen materials, vegetation, and other deleterious matter and conform to the gradation for Granular Fill in Table 1 within this specification.
4. Base Course shall be material free of rock or gravel larger than 3 inches in any dimension, debris, broken pavement, waste, frozen materials, vegetation, and other deleterious matter and conform to the gradation for Sand Gravel Fill in Table 1 within this specification.
5. Riprap shall conform to RI Standard M.10.03. Filter stone shall conform to RI Standard M.10.03.1.
6. Drainage Stone or Crushed Stone or 1 1/2" Crushed Stone shall be imported material conforming to the gradation for 1 1/2" Crushed Stone in Table 1 and having a maximum

- percentage loss of 12 percent as determined by the sodium sulfate test, AASHTO T104, and comply to the gradation provided in the table above.
7. Sand Gravel Bedding and Granular Fill Bedding shall conform to the Sand Gravel Fill and Granular Fill gradations, respectively, specified above except that 100% by weight must pass the 1 1/2" sieve.
 8. Gravel Borrow shall conform to the Sand Gravel Fill Gradation in the Table above.
 9. Structural fill below footings and slabs on grade shall conform to the Sand Gravel Fill Gradation in the Table above except that 100% by weight must pass the 1 1/2" sieve.
 10. Recycled concrete from the demolished buildings and structures on-site may be crushed and mixed with other natural soil material to generate satisfactory soils as described above.
 - a. All recycled materials shall be crushed to meet the particle size requirements of the gradations in Table 1.
 - b. Concrete shall not exceed 30% of the soil mixture by volume. All concrete pieces shall be crushed to a maximum particle size of 8".
 - c. Presence of recycled materials shall be noted on gradation tests submitted to the Engineer for review.
 - d. Imported soil materials shall be 100% free of concrete. Only concrete from demolition conducted within the project limits may be included within the soils used on this project.
 - e. Concrete shall be mixed with the soil material to create a homogenous mixture.
- D. Unsatisfactory Soils are defined as soils not conforming to the satisfactory soils criteria unless otherwise approved by the Engineer.

2.2 GEOTEXTILES

- A. Permanent Turf Reinforcement Mat: Provide North American Green SC250 permanent turf reinforcement mat or approved equivalent. The permanent turf reinforcement matting shall meet the following minimum properties per the Erosion Control Technology Council Type 5A and Federal Highway Administration's FP-03 Section 713.18.

| Test | Method | Nonwoven ⁽¹⁾ |
|---|-------------|-------------------------|
| Performance Test Unvegetated Shear Stress (lb/ft ²) | ASTM D-6460 | 2.0 min |
| Performance Test Vegetated Shear Stress (lb/ft ²) | ASTM D-6460 | 6.0 min |
| Seedling Emergence (%) | ASTM D-7322 | 250 min |
| Tensile Strength (lb/ft) | ASTM D-6818 | 150 min |
| Material Mass / Unit Area (oz/yd ²) | ASTM D-6566 | 8.0 min |
| Thickness (in) | ASTM D-6525 | 0.25 min |
| UV Stability (% @ 500 hrs) | ASTM D-4355 | 80 |

- B. Filter Fabric: Non-woven geotextile shall be nonwoven and needle punched pervious sheets of polyester, polyethylene, nylon, or polypropylene filaments formed into a uniform pattern conforming to the MIRAFI 140N or approved equivalent. The geotextile shall have minimum

properties as stated in the following table, when measured in accordance with the referenced standards.

| Test | Method | Nonwoven ⁽¹⁾ |
|--|---|-------------------------|
| Grab Tensile Strength (lbs) | ASTM D-4632 | 120 |
| Puncture Strength (lbs) | Modified ASTM D-3787 Using 5/16-inch flat tipped rod | 65 min |
| Mullen Burst (lbs/in ²) | ASTM D-3786 | 225 min |
| Elongation at Required Strength (%) | ASTM D-4632 | 50 min |
| Equivalent Opening (US Standard Sieve) | ASTM D-4751 | 70-100 |
| Permittivity (sec-1) | ASTM D-4491 with 60 mm Falling Head | 1.7 min |
| Water Flow Rate (gal/min/ft ²) at 50 mm Constant Head | (2) | 80 –120 |

- (1) All numerical values represent minimum/maximum average roll values (i.e., the average of minimum test results on any roll in a lot should meet or exceed the minimum specified values).
- (2) Water flow rate in gal/min/ft² shall be determined by multiplying permittivity in sec⁻¹ as determined by ASTM D-4491 by a conversion factor of 74.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Furnish, install, and maintain shoring, sheeting, bracing, and sloping necessary to support the sides of earth and rock excavations, and to keep and prevent any movement which may damage adjacent structures, pavements, and utilities, damage or delay the work, or endanger life and health. Furnish, install, and maintain shoring, sheeting, bracing, and sloping as required by OSHA and other applicable government regulations and agencies.
- B. All temporary shoring and bracing shall be designed, detailed, and stamped by a Professional Engineer registered in the State of Rhode Island.
- C. Provide excavation support and protection in accordance with SECTION 31 50 00 EXCAVATION SUPPORT AND PROTECTION.
- D. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent building area and walkways.

- E. The use of onsite, excavated material may require stockpiling to allow the material to dry prior to placement. Provide erosion-control measures as specified in the drawings and as required by the Owner's Representative to prevent erosion of piles during wet weather periods.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
 - 2. Install a dewatering system, specified in SECTION 31 23 19 DEWATERING, to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required at any additional expense to the Owner.

3.3 WORK IN FREEZING WEATHER

- A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees Fahrenheit.
- B. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of a day's operation. Prior to terminating operations for the day, the final layer of fill, after compaction, shall be rolled with a smooth-wheeled roller to eliminate ridges of soil left by tractors, trucks and compaction equipment.
- C. The Contractor shall not place a layer of compacted fill on snow, ice, or soil that was permitted to freeze prior to compaction. Removal of these unsatisfactory materials will be required as directed by the Owner's Representative.
- D. Do not excavate to full indicated depth when freezing temperatures may be expected, unless work can be completed to subgrade or piping can be installed and backfilled the same day. Protect the excavation from frost if placing of concrete or piping is delayed.
- E. The Contractor shall keep the operations under this Contract clear and free of accumulation of snow within the limits of Contract Lines as required to carry out the work.

3.4 ROCK EXCAVATION

- A. General
 - 1. Rock excavation includes the removal of rock to the lines and grades shown on the plans and as specified within this Section and the disposal of the Rock off site by legal methods.
 - 2. The Contractor shall obtain all necessary permit and licenses and pay all fees at no additional cost to the Owner.
 - 3. Rock capable of removal through standard excavation procedures shall be removed from the excavation, measured by the Contractor, and verified by the Owner's Representative.
 - 4. The dimensions and quantity of the uncovered rock in place and the rock removed from the trench shall be measured by a Licensed Land Surveyor registered in the State of Rhode Island at the Contractor's expense. All survey information shall be supplied to the Owner's Representative for verification of the quantity. Survey information shall include the existing

rock surface topography, the removed rock surface topography and the rock removal limits as specified herein.

5. If a change in the work occurs, which includes the excavation of additional rock outside the original contract limits, the Contractor shall uncover all rock to be removed. Upon uncovering rock in excavations that cannot be removed by standard excavation measures, the Contractor shall expose all faces of rock in the area that requires excavation and notify the Owner. The dimensions and quantity of the rock in place and the rock removed from the trench shall be measured by a Licensed Land Surveyor registered in the State of Rhode Island at the Contractor's expense. All survey information shall be supplied to the Owner's Representative for verification of the quantity.
6. Rock shall be removed by mechanical means and methods.

B. Rock Removal Limits

1. The Contractor shall remove rock to elevations, which will allow the installation of all foundations, footings, utilities, structures, trees and plantings, shown on the drawings.
2. The Contractor shall remove rock to a minimum of 30 inches below finished grade in paved areas and a minimum of 24 inches below finished grade in landscaped areas.
3. Around proposed utilities, the Contractor shall remove rock to the lines and subgrade elevations indicated on drawings and as dictated within this specification. The Contractor shall remove sufficient rock to permit the installation of permanent construction without exceeding 6 inches beneath pipe in trench, and the greater of 24 inches wider than pipe or 36 inches wide.

C. Rock Excavation for the Installation of Structures

1. Boulders and bedrock encountered during the site preparation should be removed from the building area. Any boulder or bedrock located within the building area should be removed to a depth of at least 12 inches below the foundation elevation. Voids that result from boulder removal should be backfilled with compacted Granular Fill.
2. Bedrock excavated for the building footings and slabs should be over excavated to allow for the placement of a compacted 12-inch Sand Gravel Fill cushion below the foundations and slabs placed in horizontal lifts with a maximum loose lift thickness of 12 inches. The cushion material should extend a minimum of 2 feet beyond the horizontal limits of the foundations or slab. Care should be taken when removing rock adjacent to the existing structure to prevent undermining and disturbance of the footing.

D. Rock Excavation for the Removal of Utilities and Structures

1. Remove rock directly above and to the sides of piped utilities and structures proposed for removal without exceeding the following dimensions:
 - a. 12 inches (600 mm) outside of concrete structures, walls, and footings.
 - b. 12 inches (150 mm) from either edge of piped utility and 6 inches below piped utility
 - c. 6 inches outside of edge of concrete cast against grade.
 - d. 6 inches beneath bottom of concrete pads or slabs on grade.
2. Upon uncovering rock within a trench that cannot be removed by standard excavation measures, the Contractor shall expose all faces of rock within the trench and notify the Owner. The dimensions of the rock in place shall be measured by survey instrument by a RI Licensed Land Surveyor at the Contractor's expense and verified by the Owner's Representative.
3. Rock capable of removal through standard excavation procedures shall be removed from the trench, measured by the Contractor, and verified by the Owner's Representative.

3.5 EXCAVATION, GENERAL

- A. Excavate to subgrade elevations. Material to be excavated will be classified as earth or rock. Do not excavate rock until it has been classified and quantified by the Contractor's land surveyor, and verified by the Owner's Representative

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
- B. All topsoil and unsuitable or excess materials shall be stripped from areas of new construction or regrading. Materials suitable for reuse shall be stored in locations and approved by the Owner's Representative that will not interfere with construction operations.
- C. Existing topsoil shall be stripped and stored on-site before any underlying excavating is begun. Existing topsoil is the property of the Owner and shall not be removed from the site unless authorized in writing by the Owner. Contractor shall haul material to a location on campus designated by the Owner's Representative.
- D. All excess and unsuitable materials shall be legally disposed of off-site by the Contractor.

3.6 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
- B. All unsuitable and fill materials shall be removed from the proposed building area to a limit defined by a 1-horizontal to 1-vertical slope extending downward and outward from two feet outside the edges of the building footing to firm undisturbed glacial till or bedrock. Boulders encountered within these areas shall be removed to a depth of at least 12 inches below the bottom of footings. Voids that result from boulder excavations shall be backfilled with Granular Fill and compacted.
- C. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grade to leave solid base to receive other work.
 1. Based upon the characteristics of the on-site soils, the influence area below footings is defined as the area under footings extending from 2-feet outside the bottom edge of footing downward at an angle of 1 horizontal to 1 vertical.
 2. Construction staging for the proposed building should be scheduled such that construction can proceed systematically and safely to avoid excavations within the influence areas of newly installed or existing footings. Where it will be necessary to excavate within influence areas, temporary support systems will be required to retain the surrounding soil and safely support structure loads. The scheduling process should consider the construction of structures within the project area and the construction of third-party structures that are adjacent to the project area.
 3. The earth slope along the bottom of sloped footings (i.e., subgrade or bearing surface) should not exceed a slope of 2 horizontal and 1 vertical to allow a stable subgrade to be provided prior to the placing of concrete
 4. In fill areas within the building footprint, the soil subgrade shall be surface compacted with a minimum of six passes of a vibratory roller having a drum weight of at least 10,000 pounds and a dynamic force of at least 20,000 pounds. In the event that subgrade soils within the building area become disturbed during construction, they should be over-excavated and replaced with one foot of compacted Sand Gravel Fill or six inches of ¾-inch Crushed Stone placed on a layer of filter fabric to stabilize the subgrade.
 5. If the subgrade is wet, the Contractor shall over-excavate all footing excavations by 6 inches and place a working mat of ¾-inch Crushed Stone compacted to 95% underlain by filter fabric (Mirafi 140N or approved equivalent). Stone shall extend 2 feet beyond the edge of the footing on all sides. This working mat shall be provided by the Contractor in wet conditions at no additional expense to the Owner.

- D. Over-excavation by the Contractor, excavation below the proposed bottom of excavation, shall be backfilled in 6-inch lifts with compacted Sand Gravel Fill. In wet conditions, over excavation shall be backfilled in 6-inch lifts with 3/4-inch Crushed Stone and a layer of filter fabric approved by the Engineer and compacted to 95% until the proposed subgrade elevation is reached and the subgrade stabilized.
- E. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

3.7 SUBGRADE INSPECTION

- A. Notify Owner's Representative when excavations have reached required subgrade.
- B. If the Owner's Representative determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Continue this process until the area has been proof-rolled 4-6 times. Limit vehicle speed to 3 mph (5 km/h).
 - 2. Proof-roll with a vibratory roller with a static weight of no less than 10,000 lbs and a dynamic weight of 20,000 lbs.
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by the Owner's Representative, and replace with compacted backfill or fill as directed.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Owner's Representative, without additional compensation.

3.8 EXCAVATION OF UNSUITABLE MATERIALS

- A. The Contractor shall notify the Owner's Representative and Engineer when excavations uncover potential unsuitable materials.
- B. Payment for all excavation and disposal of Unanticipated Unsuitable Soils within the limit of excavation shall be included as part of the original Contract Sum.

The dimensions and quantity of the Unanticipated Unsuitable Soils excavated shall be measured by a Professional Land Surveyor registered in the State of Rhode Island at the Contractor's expense. The Surveyor shall measure the elevations of the unsuitable materials prior to excavation and the surface topography following excavation. All survey information shall be supplied to the Owner's Representative for verification of the quantity. Survey information shall include the topography of the uncovered suitable soil surface prior to excavation and the topography of the final soil surface following excavation.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Engineer.
- B. Concrete required to fill unauthorized excavation shall be furnished and installed at the expense of the Contractor.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations in locations approved by the Owner. Do not store within drip line of remaining trees.

3.11 BACKFILL GENERAL

- A. The contractor shall notify the Engineer and Owner's Representative a minimum of 2 days prior to backfilling utility trench to schedule inspection.
- B. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation
 - 2. Surveying locations of underground utilities for Record Documents
 - 3. Testing and inspecting underground utilities
 - 4. Removing concrete formwork
 - 5. Removing trash and debris
 - 6. Removing temporary shoring and bracing, and sheeting
 - 7. Receiving approval from the respective Utility Company, and the Owners Representative following inspection
- C. Place backfill on subgrades free of mud, frost, snow, or ice.
- D. The Contractor is allowed to re-use excavated On-Site Common Borrow as fill in accordance with this specification. All On-Site Common Borrow used as backfill shall be compacted to the required percentage of maximum dry density included in the Table below.
 - 1. The Contractor is made aware that On-Site Common Borrow contains a large amount of silt. Additional efforts required to reuse On-Site Common Borrow are the responsibility of the Contractor and shall result in no additional expense to the Owner.
 - 2. The Contractor agrees to use this material at his own risk and is responsible for any additional work required to install this material in accordance with the specifications.
 - 3. If project delays will result from the additional time required to re-work On-Site Common Borrow, placed as fill in accordance with the specifications, the Contractor shall remove material that does not meet the compaction requirements and provide imported fill meeting the specifications. This imported material shall be provided at no additional expense to the Owner.
 - 4. Any project delays resulting from additional time required to work this material are the responsibility of the Contractor.

3.12 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact initial backfill conforming to the specified material requirements to the height specified on the Drawings over the utility pipe or conduit.
- C. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- D. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- E. Bedding material shall be placed and compacted in maximum 6" lifts.

3.13 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.
 - 3. The Contractor shall furnish water for compaction. Water for compaction from sources other than potable sources shall be as approved by the Owner's Representative.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Compaction shall be completed with a vibratory roller having a static weight of 10,000 lbs and a dynamic weight of 20,000 lbs.
- C. The Contractor shall use caution when compacting near existing utilities including electric and communications duct banks. Any damage to existing utilities or structures resulting from compaction operations shall be repaired at the expense of the Contractor.
- D. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- E. The Contractor is allowed to re-use excavated On-Site Common Borrow as fill in accordance with this specification. All On-Site Common Borrow used as backfill shall be compacted to the required percentage of maximum dry density included in the Minimum Compaction Requirements Table Below.
- F. The Contractor is made aware that on-site Common Borrow is silty. The Contractor agrees to use this material at his own risk and is responsible for any additional work required to install this material in accordance with the specifications. In the event that project delays result from the additional time required to re-work On-Site Common Borrow placed as fill in accordance with the specifications, the Contractor shall remove material that does not meet the compaction requirements and provide imported fill meeting the specifications. This imported material shall be provided at no additional expense to the Owner. Any project delays resulting from additional time

required to work this material are the responsibility of the Contractor and shall be made up elsewhere on the project.

- G. Compact soil materials to not less than the following percentages of maximum dry density:

| MINIMUM COMPACTION REQUIREMENTS TABLE | |
|--|---|
| Location | Percent of Maximum Dry Density ¹ |
| Backfill below footings, within the building area and below slabs ² | 95 |
| Backfill for foundation walls and frost walls | 95 |
| Backfill within pavement base and sub base layers | 95 |
| Backfill below pavement sub base layers | 92 |
| Around and above utilities within the building area | 95 |
| Around and above utilities in paved areas | 92 |
| Backfill behind retaining walls | 95 ³ |
| Backfill within landscaped areas | 85 |

¹ Maximum dry density as determined by the Modified Proctor test (ASTM D 1557)

² Building area is described as an area extending downward and outward from the outside edge of the footing at a 1H:1V slope.

³ During compaction of fill placed behind retaining walls, care shall be taken so as to maintain uniform elevation along both sides within the embedded areas, and to not overstress the wall by applying too much compactive energy at the top of the wall.

3.15 SUBBASE AND BASE COURSE

- A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
- B. Place subbase and base course on subgrade in 6-inch lifts and compact as specified.

3.16 FIELD QUALITY CONTROL

- A. Testing Agency: The Contractor shall engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed every 100 feet to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by the Owner's Representative.
 2. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests.
 3. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
 4. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.
- D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.17 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specify tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace soil material to depth as directed by Owner's Representative; reshape and recompact.
- C. Where settling occurs remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Topsoil is the property of the Owner and shall not be removed from the site without the Owner's written permission. Contractor shall haul material to a location on campus designated by the Owner's Representative.
- B. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by the Owner's Representative.
1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

3.19 GEOTEXTILES

- A. Install Geotextiles in accordance with Manufacturer's recommendations.

PART 4 - MEASUREMENT AND PAYMENT

4.1 GENERAL

- A. Payment for earthwork as outlined in this Section or shown on the Drawings, including, but not limited to, all design, submittals, materials, labor, equipment, and all other incidentals associated with this work shall be included in the Contractor's Base Bid.
- B. All quantities of unanticipated unsuitable soils and rock excavated are to be measured in place by a Professional Land Surveyor registered in Rhode Island as described above and verified by the Owner's Representative prior to removal.
- C. The Contractor shall submit signed slips showing quantities of Unanticipated Unsuitable Soils and Rock removed from excavations at the end of each workday, with a total quantity mutually agreed upon. Slips shall be signed by the Owner's on-site representatives at the end of each day signifying that the quantities are accurate. The Owner has the right to inspect individual loads, slips and quantities as they arrive at or leave from the site and as they are weighed out at the stone quarry.

END OF SECTION

SECTION 311100

SITE PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. All work specified in this Section shall conform to "Standard Specifications for Road and Bridge Construction" of the Rhode Island Department of Transportation, latest revision, herein referred to as "State Standards".

1.3 SUMMARY

- A. The work of this Section includes the following:
 - 1. Provisions for protection of all existing utilities from damage particularly at heavy construction vehicle crossings.
 - 2. Removal, disposal, capping or plugging of drainage, sewer, gas, steam, and water piping at the locations specified on the drawings.
 - 3. Removal and disposal of flexible pavement, curbing, concrete entrance ramps, and concrete walks at the locations specified on the drawings.
 - 4. Removal and disposal of catch basins, manholes, cisterns, utility structures.
 - 5. Removal and disposal of steps, stairs, signs, and fence.
 - 6. Removal and disposal of remnants of concrete and stone foundations.
 - 7. Cleaning and maintenance of the site and stormwater management system.
 - 8. Removal and disposal of cesspools, leaching areas, and septic tanks.
 - 9. Transport and Disposal of Contaminated Soils
- B. Related Sections include the following:
 - 1. Section 310000 Earthwork

1.4 DEFINITIONS

- A. Cleaning as described in Subsection 212.01.2a of the State Standards.
- B. Maintenance as described in Subsection 212.01.2b of the State Standards.
- C. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.

- D. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.5 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain on the Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.
- B. The Owner reserves the right to claim ownership over any materials removed from the site, including earthwork. The materials claimed by the Owner shall be stockpiled on the site as directed.
- C. Stripped Topsoil is the property of Camp Fogarty and shall not be removed from the site. Contractor shall haul topsoil to a location designated by the Owner.

1.6 SUBMITTALS

- A. Shop Drawings:
 - 1. Submit drawings or details indicating proposed provisions for protection of existing gas line and utilities as the work requires. These utilities must be protected from damage particularly by heavy construction equipment driving over the top of them.

1.7 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner, Owner's Representative, and Architect not less than two weeks in advance of proposed utility interruptions in writing. Renotify in writing 72 hours in advance of proposed utility interruptions.
 - a. Notification should be made to Rhode Island Army National Guard
Ann Marie Ethier (401) 275-4189
 - 2. Do not proceed with utility interruptions without Owner's written permission.
 - a. All power shut downs shall be coordinated with the Owner and shall be on week-ends between 6:30 a.m. and 7:00 p.m.
 - 3. Underground utilities were compiled from available record plans and aboveground locations and are approximate. The Contractor shall contact "Dig-Safe" at 1-888-DIGSAFE 72 hours to mark existing utilities prior to commencing work on any part of the site.
- B. The Contractor is responsible to schedule the work and determine any required temporary utility lines and connections required to keep the existing facilities in operation. The cost to furnish and install temporary utility lines and connections shall be included in the Contactor's base bid.
- C. Contractor shall not operate existing water gate valves and hydrants. All operation of the water distribution system must be completed by the Utility Company personnel.
- D. All abandoned underground utilities shall be designated on as-built drawings by the Contractor of record and provided to the Owner and Engineer in AutoCAD electrical format prior to completion of the project. All as-built drawings, (underground and above ground) shall be dimensioned from permanent benchmarks such as existing buildings and include depths at various points throughout the extent of the work, and invert elevations at all structures.

- E. Do not commence site operations until temporary erosion and sedimentation control measures are in place.
- F. Removal of all asbestos piping or structures, if found, shall be in accordance with Subsection 201.03.8 of the State Standard Specifications.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The Contractor shall provide all materials and equipment in suitable and adequate quantity as required to accomplish the work shown and specified

PART 3 - EXECUTION

3.1 REMOVE AND DISPOSE DRAINAGE AND OTHER GRAVITY UTILITY PIPING

- A. All pipe or conduit designated to be removed shall be so-removed and legally disposed of off-site. Drain pipes or other pipes, ducts, etc., cut and deemed advisable to remain in the earth shall be plugged with concrete, except that metal drain pipes may be sealed with screw type plugs or caps. Drain pipes or other pipes that are cut for a new connection shall be temporarily capped and sealed water tight to prevent sediment or water from entering the utility.
- B. The Contractor shall cooperate with the Owner and utility companies so that the demolition work may be performed in accordance with their regulations and with the approval of the Owner.
- C. Removal of all asbestos cement pipe, if found, shall be in accordance with Subsection 201.03.8 of the State Standard Specifications.

3.2 REMOVE AND DISPOSE CONCRETE UTILITY STRUCTURES

- A. All concrete utility structures designated to be removed shall be so-removed and legally disposed of off-site. The Contractor shall cooperate with the Owner and utility companies so that the demolition work may be performed in accordance with their regulations and with the approval of the Owner's Representative.

3.3 REMOVE AND DISPOSE CONCRETE RETAINING WALLS AND STAIRS

- A. The Contractor shall excavate concrete or stone foundation remnants uncovered during excavation for proposed improvements. Remove and dispose concrete and stone foundation remnants in accordance with local and State requirements.

3.4 REMOVE AND DISPOSE CONCRETE OR STONE FOUNDATION REMANTS

- A. The Contractor shall excavate concrete or stone foundation remnants uncovered during excavation for proposed improvements. Remove and dispose concrete and stone foundation remnants in accordance with local and State requirements.

3.5 DISPOSAL

- A. Disposal: Remove surplus soil material, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property. Any potentially contaminated soil material encountered, as specified by the State of Rhode Island Department of Environmental Management rules and regulations, shall be brought to the Rhode Island Resource Recovery Corporation or another appropriately licensed waste facility for legal disposal.
- B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

3.6 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction. The Contractor shall employ a Professional Land Surveyor registered in the State of Rhode Island to perform a benchmark and field verification survey prior to commencing work. The Contractor is responsible to provide horizontal and vertical layout of all proposed work.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated. Review trees with Owner and Landscape Architect prior to removal.
- C. Protect existing site improvements to remain from damage during construction.
- D. Restore damaged improvements to their original condition, as acceptable to Owner.

3.7 CLEANING AND MAINTENANCE OF STORM DRAIN SYSTEM

- A. The Contractor shall remove sediment and debris from the existing drainage system prior to commencing work.
- B. During construction the Contractor shall be responsible to clean sediment and debris from the existing and recently installed drainage system.
- C. Prior to project completion the complete drainage system shall be cleaned of all debris and sediment.

PART 4 - EXECUTION

4.1 GENERAL

- A. Payment for foundation removal and disposal as outlined in this Section or shown on the Drawings, including, but not limited to, all design, submittals, materials, labor, equipment, and all other incidentals associated with this work shall be included in the Contractor's Base Bid.
- B. Unit prices for foundation removal shall include all labor, equipment, and materials required for removal of concrete, hauling of foundation off-site and legal disposal. Unit prices for foundation removal also include all labor, equipment, and materials required for replacement of foundation with approved materials. Any excavation beyond the specified excavation limits must be approved by the Owner's Representative prior to removal.
 - 1. Quantities and Payment of Concrete Foundation Removal:

- a. Concrete Foundations encountered during excavation or other construction activities are to be removed and replaced as required with approved material as determined by the Owner's Representative.
 - b. If Concrete Foundations are encountered beyond the limits of excavation as specified on the Drawings and Specifications, the Contractor shall notify the Owner's Representative in writing. The Contractor shall carry excavation deeper and replace the excavated material with appropriate specified material or concrete as directed by the Owner's Representative or Geotechnical Engineer. Payment is to be the same as that for Concrete Foundation encountered within the limits of excavation.
- C. All quantities of foundation removal are to be measured in place by a Professional Land Surveyor registered in Rhode Island as described above and verified by the Owner's Representative prior to removal.
- D. The Contractor shall submit signed slips showing quantities of Foundation Removal removed from excavations at the end of each workday, with a total quantity mutually agreed upon. Slips shall be signed by the Owner's on-site representatives at the end of each day signifying that the quantities are accurate. The Owner has the right to inspect individual loads, slips and quantities as they arrive at or leave from the site and as they are weighed out at the stone quarry. These quantities are for reference only and will not be used to calculate payment with the unit prices above.

4.2 TRANSPORT AND DISPOSAL OF CONTAMINATED SOILS

- A. The Contractor shall submit signed slips showing quantities of Transport and Disposal of Contaminated Soils at the end of each workday, with a total quantity mutually agreed upon. Slips shall be signed by the Owner's on-site representatives at the end of each day signifying that the quantities are accurate. The Owner has the right to inspect individual loads, slips and quantities as they arrive at or leave from the site and as they are weighed out at the disposal facility.

END OF SECTION

SECTION 312319

DEWATERIING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 of the Rhode Island Department of Transportation Standard Specifications Sections, apply to this Section

1.2 REFERENCES

- A. All work specified in this Section shall conform to "Standard Specifications for Road and Bridge Construction" of the Rhode Island Department of Transportation, latest revision, herein referred to as "State Standards".

1.3 SUMMARY

- A. This Section includes construction dewatering for utility trenches and utility structure installation.
- B. Related Sections include the following:
 - 1. Section 310000 – Earthwork.
 - 2. Section 315000 – Excavation Support and Protection.

1.4 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control ground-water flow into excavations and permit construction to proceed on dry, stable subgrades.
- B. Maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
- C. Prevent surface water from entering excavations by grading, dikes, or other means.
- D. Remove dewatering system if no longer needed.

1.5 SUBMITTALS

- A. Shop Drawings for Information:
 - 1. For dewatering system. Show arrangement, locations, and details of dewatering locations; locations of erosion controls and dewatering basins.
 - 2. Include a written report outlining control procedures to be adopted if dewatering problems arise.

- B. Record drawings at Project closeout identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions performed during dewatering.
- C. Field Test Reports: Before starting excavation, submit test results and computations demonstrating that dewatering system is capable of meeting performance requirements.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with water disposal requirements of authorities having jurisdiction.
 - 1. At no time is discharge to be allowed to enter an existing drainage structure without sedimentation controls. Any damage caused by dewatering will be repaired in full to match existing conditions at the Contractor's expense.
 - 2. At no time is discharge allowed to enter the existing sanitary sewer system.

1.7 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by the Owner's Representative and then only after arranging to provide temporary utility services according to requirements indicated.
- B. Make additional test borings and conduct other exploratory operations necessary for dewatering.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The Contractor shall provide any equipment and materials necessary for dewatering at the Contractor's own expense.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
- B. Prevent surface water and subsurface or groundwater from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
- C. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- D. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
- E. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

- F. Provide erosion controls in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook.
- G. Dewatering basins capable of handling the flows directed to them shall be supplied whenever dewatering is required.

3.2 INSTALLATION

- A. Install dewatering system utilizing pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
- B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, utilities, and structures have been constructed and fill materials have been placed, or until dewatering is no longer required.
- C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of drain utilities and other excavations.
- D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water in a manner that avoids inconvenience to others.
- E. Provide sumps, dewatering basins, sedimentation tanks, and other flow-control devices to avoid erosion and sedimentation.
- F. Direct discharges to storm drains will be unacceptable unless proper sediment and siltation removal devices are installed prior to discharge to the storm water conveyance system.
- G. Any discharge of water, generated from a dewatering operation, directly into wetlands or an open water body will not be permitted.
- H. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.
- I. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.
- J. Damage including but not limited to erosion or sedimentation, resulting from untreated dewatering discharges shall be restored to meet or exceed the existing condition. All remedial work shall be completed in accordance with local and State Environmental Regulations and Requirements.

3.3 PROPERTY LOSSES FROM REMOVAL OR DISTURBANCE OF GROUNDWATER

- A. Any structure, including but not limited to embankments, buildings, streets, and utilities that become unstable or vulnerable to settlement due to removal or disturbance of groundwater will be supported immediately by the Contractor. Support shall include but not be limited to bracing, underpinning, or compaction grouting.

- B. All loss or damage arising from removal or disturbance of groundwater, including but not limited to claims for subsidence and the loss of structure support, that may occur in the prosecution of the work shall be sustained and borne by the Contractor. If the Contractor needs to correct the damage resulting from his operations, the Owner may, 30 days after notifying the Contractor in writing, proceed to repair, rebuild or otherwise restore such damaged property as may be deemed necessary, and the cost thereof shall be deducted from compensation which may be or become due the Contractor under this Contract.

END OF SECTION

SECTION 313200

EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. All work specified in this Section shall conform to "Standard Specifications for Road and Bridge Construction" of the Rhode Island Department of Transportation, latest revision, herein referred to as "State Standards".

1.3 SUMMARY

- A. The work of this Section includes the following:
 - 1. Provision of temporary erosion and sediment controls and permanent site stabilization, specifically compost filter socks, baled hay erosion checks, temporary diversions, temporary sediment traps, and catch basin inlet protection as indicated on the drawings or as directed by the Owners Representative.
 - 2. Maintenance and cleaning of erosion and sedimentation controls specifically compost filter socks, baled hay erosion checks, temporary diversions, temporary sediment traps, and catch basin inlet protection as necessary or as directed by the Owner's Representative.
- B. Related Sections include the following:
 - 1. Section 31 00 00 Earthwork.

1.4 DEFINITIONS

- A. Cleaning as described in Subsection 212.01.2a of the State Standards.
- B. Compost Filter Sock: Three-dimensional tubular filtration device constructed by filling a mesh tube with a compost filter media.
- C. Maintenance as described in Subsection 212.01.2b of the State Standards.

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. Product information depicting that the products furnished meet the project specifications.
 - 2. Provide a Phasing Plan for each phase of the proposed work. Use the Soil Erosion and Sediment Control Plan prepared for the project and approved by RIDEM to prepare a Phasing Plan for each construction phase depicting the location of the following:
 - a. portions of the site that will be exposed

- b. areas that will be temporarily seeded
- c. construction entrances
- d. laydown areas
- e. general temporary grading scheme
- f. temporary diversions or swales
- g. temporary sediment traps
- h. perimeter sediment barriers,
- i. dewatering areas
- j. concrete washout areas
- k. designated fueling areas

1.6 PROJECT CONDITIONS

- A. Do not commence operations which disturb the ground surface until temporary erosion and sedimentation control measures are in place.
- B. The Contractor is responsible to follow the "Soil Erosion and Sediment Control Plan" prepared for this project. This Plan has been reviewed by RIDEM and is subject to the RIPDES program. The Contractor is required to meet all conditions of this permit document.
 - 1. The Contractor shall provide Phasing Plans depicting the information requested herein and any other pertinent information. The Contractor is responsible to update this Phasing Plan prior to expanding the work area and exposing additional portions of the site.
- C. Preexcavation Conference: Conduct conference at Project site to comply with requirements in Division.
 - 1. Erosion controls and the first Phasing Plan shall be discussed at this meeting.

PART 2 - PRODUCTS

2.1 EROSION AND SEDIMENTATION CONTROL MEASURES

- A. Compost Filter Sock.
 - 1. Materials shall be in accordance with AASHTO Designation: MP 9-06. Compost material shall meet applicable Federal and State Regulations.
 - 2. For compost filter socks 18" or less in diameter, wooden stakes shall be 1 inch by 1 inch, at 10-foot intervals on center, and of a length that shall project into the soil 1 foot leaving 3 to 4 inches protruding above the filter sock.
 - 3. For compost filter socks greater than 18" in diameter, wooden stakes shall be 2 inch by 2 inch, at 10-foot intervals on center, and of a length that shall project into the soil 1 foot leaving 3 to 4 inches protruding above the filter sock.
- B. Haybales as described in Subsection 206.02.1 and 206.02.2 of the State Standards.
 - 1. Haybales shall conform to Subsection 206.02.1 of the State Standards.
 - 2. Haybales shall have a minimum cross section measuring 18" x 18" with a minimum 36" length.
 - 3. Wood stakes shall be oak and conform to the dimensions shown on the plans.
- C. Temporary Turf Reinforcement Mat
 - 1. Temporary turf reinforcement mats shall be North American Green Product S150 or approved equivalent.
 - 2. Temporary turf reinforcement mat shall be degradable after 12 to 24 months
 - 3. Provide a temporary turf reinforcement mat designed to stabilize a 3:1 slope or greater.

- D. Filter Fabric
 - 1. See Geotextiles in Division 2 Section 31 00 00 "Earthwork" for specification.
- E. Temporary Seed
 - 1. Provide temporary seeding per subsection L.02 Type 3 Temporary Seeding of the State Standards.
- F. Temporary Sediment Traps, Swales, and Diversions
 - 1. Refer to Section 310000 Earthwork for soil materials and excavation.
 - 2. Provide temporary seeding.
 - 3. Provide turf reinforcement mat as required to stabilize side slopes.
- G. Construction Accesses
 - 1. Construction Accesses shall comply with RIDOT Standard Specification Section 211.

PART 3 - EXECUTION

3.1 PROVISION OF COMPOST FILTER SOCKS

- A. Trenching is not required, for typical installation; therefore, soil should not be disturbed upon installation. Compost filter socks shall be placed over the top of ground and wooden stakes shall be driven through the center of the filter socks to anchor them to the ground. To ensure optimum performance, heavy vegetation shall be cut down or removed and extremely uneven surfaces shall be graded to ensure that the compost filter sock uniformly contacts the ground surface.
- B. Compost filter socks may be vegetated by incorporating seed into the compost prior to placing it in the tube.
- C. The ends of the compost filter sock shall be directed upslope, to prevent stormwater from running around the end of the sock.

3.2 PROVISION OF BALED HAY EROSION BARRIERS AND CHECK DAMS

- A. In accordance with Subsection 206.03.1 of the State Standards.

3.3 TEMPORARY TURF REINFORCEMENT MAT

- A. Install turf reinforcement mat on all exposed cut/fill slopes with a slope 3:1 or greater to protect against rainfall and wind erosion and hold moisture content to enhance vegetation growth in seed where shown in the plans.
- B. Install erosion control lining in the required locations immediately after the areas has been seeded.
 - 1. Place the erosion control lining over the seed mulch to fit against the contours of the area. It shall be applied without stretching, lie smoothly but loosely, and be free of wrinkles and bunches. Roll the material in place and in the direction of the flow of surface water. Anchor the up-grade end of the erosion lining in a narrow trench 6" deep. Firmly tamp the trench backfill in place.
 - 2. In ditches and on slopes, provide check or junction slots at no greater than 50' intervals.

3. Where the erosion lining comes into contact with the edges of catch basins or other structures, place a tight fold in the edge of the material and bury it a minimum of 6" into the soil.
4. Install staples no more than 6" apart at all anchor, junction or check slots.
5. Where two lengths of erosion control lining are joined, the end of the upgrade strip shall overlap the downgrade by a minimum of 6" strip and the two strips shall be anchored together.

3.4 MAINTENANCE AND CLEANING OR EROSION AND POLLUTION CONTROLS

- A. In accordance with Subsection 212.03 of the State Standards.
- B. Repair all erosion controls at substantial completion and request inspection and approval of the condition of the protection from the Owner's Representative.

3.5 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to the Drawings.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Following stabilization of the site and the receipt of permission from the Owner's Representative, the Contractor shall remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.6 DISPOSAL

- A. Disposal: Remove surplus soil material, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property. Any potentially contaminated soil material encountered, as specified by the State of Rhode Island Department of Environmental Management rules and regulations, shall be brought to the Rhode Island Resource Recovery Corporation or another appropriately licensed waste facility for legal disposal.
- B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

3.7 PREPARATION

- A. Restore damaged improvements to their original condition, as acceptable to Owner.

3.8 TEMPORARY SEEDING

- A. In accordance with Subsection L.02 for Type 3 Temporary Seeding of the State Standards: 3.08 CONSTRUCTION ACCESSES

- B. In accordance with Section 211 Construction Accesses of the State Standards.

END OF SECTION

SECTION 315000

EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. All work specified in this Section shall conform to "Standard Specifications for Road and Bridge Construction" of the Rhode Island Department of Transportation, latest revision, herein referred to as "State Standards".

1.3 SUMMARY

- A. This Section includes temporary excavation support and protection systems.
- B. Related Sections include the following:
 - 1. Section 312319 - Dewatering.
 - 2. Section 310000 - Earthwork.

1.4 PERFORMANCE REQUIREMENTS

- A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.
 - 1. Provide professional engineering services needed to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a qualified professional engineer.
 - 2. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 3. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.
- B. The Contractor assumes all responsibility for the excavation support systems used. In the event of a failure, all resulting damages are the responsibility of the Contractor.

1.5 SUBMITTALS

- A. Shop Drawings for Information: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.
 - 1. Include Shop Drawings signed and sealed by a qualified Registered Professional Engineer licensed in the State of Rhode Island.
 - 2. Working drawings and details on the excavation support proposed by the Contractor shall be provided along with detailed calculations showing the design of the bracing and sheeting

proposed also stamped by a Registered Professional Engineer licensed in the State of Rhode Island.

3. Working Drawings and design calculations, at a minimum, shall indicate the following:
 - a. Design criteria.
 - b. Details, arrangement and method of assembly and disassembly of proposed system and sequence of construction.
 - c. Connection details.
 - d. Method of preloading the bracing.
 - e. Full excavation depth.
 - f. Loads on support system for various stages of excavation and bracing removal.
 - g. Expected equipment loads.
 - h. Maximum design load carried by various members of support system, and preload values.
 - i. Depths below main excavation to which support system will be installed.
 - j. Methods of resolving difficulties arising from misalignment of soldier piles or steel sheetpiling exposed during excavation, and criteria for implementing procedures.
 - k. Design calculations, for various stages of excavation and bracing removal.
 - l. Existing utility facilities. After checking locations by field investigations, revise drawings to show actual locations of facilities and excavation supports interference with proposed Work, and measures proposed to overcome such interferences.
 - m. Manufacturer's product data.
4. Design Computations: The Contractor shall also submit complete computations for the design of the sheeting and bracing system(s) proposed to be installed.
 - a. The design shall be in accordance with sound engineering practice and modern, accepted principles of soil mechanics.
 - b. The design shall include the effects of all surcharge which may be reasonably anticipated.
 - c. The minimum factor of safety for each of the design conditions required to be considered shall be 1.50.

B. Qualification Data for Installer and Professional Engineer.

C. Submittal Review:

1. The design and layout will be reviewed by the Engineer as to type and suitability, providing that the arrangements presented by the Contractor are satisfactory, but such review will not relieve the Contractor of the sole responsibility for the adequacy of the system, nor shall it be construed as a guarantee that the Contractor's proposed equipment, materials and methods for sheeting and bracing will be adequate for the work required at the locations of and for the work required by this contract.

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
- B. The Contractor may make test borings and conduct other exploratory operations necessary for excavation support and protection.
- C. Survey adjacent structures and improvements adjacent to the excavation support system to monitor settlement. Employ a qualified professional engineer or land surveyor to establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations during construction.

- D. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Owner's Representative if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

1.7 QUALITY CONTROL

- A. Provide in accordance with the requirement as specified in Division 1 Specification Sections.
- B. Support of Excavation shall be of sufficient strength to safely sustain all loads from the sides of the excavations, together with all water pressure and reasonable surcharge.
- C. The Contractor shall, at all times, be entirely responsible for the adequacy of sheeting and bracing used:
 - 1. to permit the satisfactory and safe installation and construction of the work;
 - 2. to provide adequate protection against damage to all existing utilities, structures, and completed portions of the work; and
 - 3. to prevent injury to persons.
- D. The Contractor shall control, and pitch, the grading to prevent water from running into the excavated areas of the structures, or to prevent damage to other structures or work already accomplished.
 - 1. Welding Operations – in accordance with AWS D1.1

1.8 DESIGN CRITERIA

- A. This design criteria applies where the Contractor is responsible for design of the excavation support:
 - 1. Design the excavation support system in accordance with the earth pressures and other detailed criteria indicated.
 - 2. Design the excavation support system to support the earth pressures, decking system and AASHTO HS20 traffic loads if any, utility loads, equipment and construction loads, and other surcharge loads to allow the safe and expeditious construction of the permanent structures without movement or settlement of the ground, and to prevent damage to, movement or settlement of, adjacent buildings, structures, or utilities.
 - 3. Design sheet pile and soldier pile and lagging excavation support systems to penetrate to a depth below the bottom of excavation adequate to prevent lateral and vertical earth movement, and permit lowering of the indicated bottom of excavation at least two feet without any change in the support system as installed except for additional lagging and bracing for soldier pile and lagging systems.
 - 4. Design the bracing system to furnish sufficient reaction against the side banks to maintain stability in such banks. Obtain such reaction by timely stressing to predetermined locations until the necessary reaction is produced against the banks, or by such other methods that may be necessary to prevent displacement of ground and movement of structures.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Structural Steel:
 - 1. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.

2. Steel sheet piling – ASTM A328, ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.
- B. Lagging:
1. Timber Lagging: use sound, well-seasoned Douglas Fir of rectangular cross section, Grade 2 or better. Timber shall be stamped and certified ALOPB LP-22 by the American Preserves Bureau.
 2. Moisture Content shall not exceed 20%.
 3. Minimum fiber stress in bending perpendicular to the grain shall be 1200 psi.
- C. Timber Sheeting:
1. Any species of wood sheets that will satisfactorily withstand all driving and construction stresses and the loads, to which the members will be subjected, may be used for sheeting and bracing.
 2. Wood sheeting shall not be less than three (3) inches nominal thickness.
 3. All timber sheeting and bracing shall be free from worm holes, windshakes, loose knots, decayed or unsound portions of other defects which might impair its strength or tightness.
- D. Other Materials:
1. The Contractor shall provide all hardware and fastenings necessary to accomplish satisfactory installation of all sheeting and bracing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Sheeting and bracing shall be of sufficient strength to sustain all loads from the sides of the excavations, together with all water pressure and surcharge.
- B. The Contractor shall be entirely responsible for adequacy of sheeting and bracing used, and shall take all precautions necessary to prevent movement of material along the sides of excavations, and to prevent the intrusion of water beyond that which his pumping or well point system can control.
- C. Sheeting shall be permanently left in place where indicated or directed.
- D. It is expressly understood and agreed that whenever sheeting and bracing is used, it shall not relieve the Contractor of the sole responsibility for any damages, delays, or injury due to installation or failure of the sheeting or bracing, or the settling of the backfill, the pipeline, or the adjacent ground.

3.2 TIMBER SHEETING

- A. Sheeting shall be driven to sufficient depth below the deepest excavation level to maintain sufficient restraint of the adjacent soil and to prevent movement of the sheeting or excessive intrusion of groundwater.
- B. If voids occur behind the sheeting, they shall be filled immediately with proper material from earth excavation or other sources to the satisfaction of the Engineer.

- C. Withdrawal of sheeting shall be carefully performed to prevent movement of material along the sides of the backfilled excavations, to prevent damage to utilities, structures, or the work, and to avoid injury to persons.
- D. Unless otherwise permitted, sheeting shall be withdrawn in lifts of not more than four (4) feet, and all voids shall be filled immediately with selected materials and thoroughly compacted.

3.3 STEEL SHEET PILING

- A. Install in plumb position with each pile interlocked with adjoining piles for its entire length so as to form a continuous diaphragm throughout the length of each run of wall, being tightly against original ground. Use vibratory pile driver to install sheeting to depth required for design. The equipment and methods of installation, cutting, and splicing shall conform to the approved Working Drawings.
- B. Steel sheet piling located within a one to one slope from the bottom of the foundation element shall not be removed.

3.4 SOLDIER PILES AND LAGGING

- A. Provide bored holes for soldier piles adequate to accommodate pile sections shown on approved Working Drawings. Extend holes to necessary depth below level of subgrade. When pre-boring is to occur within two feet of a utility, uncover utility and install a steel drill casing to a level at least six inches below bottom of utility prior to pre-boring.
- B. Carry bottom of sheeting system to a depth below main excavation adequate to prevent lateral movement and to obtain adequate vertical support. In areas where additional excavation is required below main excavation subgrade, prevent movement of main excavation supports.
- C. Encase soldier piles with 2500 psi concrete up to lowest point of excavation adjacent to pile location. Fill remainder of hole with lean concrete, completely encasing pile.
- D. Use timber lagging secured in place to soldier piles.
- E. Follow excavation closely with placement of lagging. Do not allow height of unlagged face of excavation to exceed five feet in rock and predominately clayey soils, or three feet in sandy soils. Extend lagging to final subgrade. Decrease height as required to prevent ground movement.
- F. Do not permit height of unlagged face to exceed 15 inches if water flows from face of excavation, or if soil (of any type) in face moves towards excavation area. Decrease unlagged face height as required to prevent ground movement.
- G. Carefully perform excavation for installation of lagging to minimize formation of voids. Separate lagging members only as necessary to permit packing behind them.
- H. Pack behind lagging as installation progresses; establish tight contact between excavation face and lagging. Pack openings between lagging members with straw or other suitable material to allow free drainage of water without loss of soil or sand packing.
- I. If unstable material is encountered during excavation, take suitable measures to contain unstable material in place and prevent ground displacement, which may cause damage.

- J. Maintain sufficient quantity of material on hand for lagging, bracing and other operation for protection of Work and for use in case of accident or emergency.

3.5 SUPPORT SYSTEMS WITH INTERNAL BRACING

- A. Use walers, struts, and rakers as necessary to provide internal support of excavation faces retained by soldier piles. Internal columns are unacceptable.
- B. When walers are used, obtain tight bearing between wales and wall, and ample bearing area with starpack for load transfer.
- C. Provide struts as indicated and intermediate bracing as needed to enable struts to carry maximum design load without distortion or buckling.
- D. Provide diagonal bracing as needed for stability of system.
- E. Include web stiffeners, plates or angles as needed to prevent rotation, crippling or buckling of connections and points of bearing between structural steel members. Allow for eccentricities caused by field fabrication and assembly.
- F. Install and maintain internal bracing support members in tight contact with each other and with surface being supported. Attach struts to wales using direct end bearing vertical plate (shimmed) connections at all levels.
- G. Design internal bracing support members for maximum forces occurring during excavation or removal stages.
- H. Preloading:
 - 1. Preload internal bracing members, including struts, (except deck beams), shores and similar members, to 50 percent of design compression load occurring during excavation phase.
 - 2. Use procedures that produce uniform loading on bracing members without inducing appreciable eccentricities or overstressing and distortion.
 - 3. Make provisions for permanently fixing each member with steel shims or wedges welded into place.
 - 4. Accomplish preloading by jacking supports in place against soldier piles or wales.
 - 5. Do not use wooden wedges to preload bracing member.
 - 6. Include in preloading system means to determine, within five percent, amount of preload induced into bracing members.
- I. If decking beams are not required, or if decking beams are not designed to support excavation loads, install uppermost tier of bracing at vertical distances not more than eight feet below top of excavation.
- J. Install tiers of internal bracing with a vertical distance between them and level of excavation below of not greater than 15 feet. Reduce maximum vertical distance to nine feet where ground movement and settlement shall be minimized to prevent damage, where indicated or as directed.
- K. Excavate below point of support as indicated. Install bracing, and preload immediately after installation and before continuing excavation.
- L. When removing struts, increase vertical spacing provided invert slab has been placed for at least ten days and support system is adequate to support, safely, adjacent structures and works.

- M. Vertical spacing of bracing may be increased when removing struts, provided support system is adequate to support adjacent structures and works.

3.6 REMOVAL OF SUPPORTING SYSTEM

- A. When removing excavation support system, do not disturb or damage adjacent buildings structures, construction, or utility facilities. Fill voids immediately with lean concrete or with approved backfill compacted to the density as specified in Section 31 00 00, "Earthwork".
- B. Except as specified herein and below, remove sheeting system to a depth of at least six feet below the ground surface.
- C. Remove material of supporting system from the Worksite immediately.

END OF SECTION

Division 32 – Exterior Improvements

SECTION 32 31 13

CHAIN LINK FENCE

PART 1 - GENERAL

1.1 WORK TO BE PERFORMED

- A. This section specifies requirements for chain link fencing and accessories including gates, posts and post foundations, hardware and appurtenances, of various types and configurations at the locations indicated on the Drawings or as directed by the Owner, all in accordance with this Specifications.
- B. The Contractor shall provide all labor, equipment, materials and accessories necessary to install all chain link fence and gate.

1.2 REFERENCES

- A. AASHTO M181 – Chain-Link Fence
- B. All work specified in this Section shall conform to “Standard Specifications for Road and Bridge Construction” of the Rhode Island Department of Transportation, latest revision, herein referred to as “State Standards”.

1.3 SUBMITTALS

- A. The Contractor shall submit the following for approval:
 - 1. Three samples, approximately 6 inches long or 6 inches square, of fabric material, post section, and typical accessories.
 - 2. Shop drawings showing fence layout & dimensions, height, sizes of posts, rails, braces, gates, footings, accessories, bending strengths, and assembly.
 - 3. Manufacturer’s certified test data demonstrating compliance with all performance specifications for color coating of framework and fabric.
 - 4. Provide Manufacturer’s standard limited warranty that its Galvinal Fabric/Galvanized Framework Chain Link Fence is free from red dust and other defects in material and workmanship for a period of 25 years from the date of purchase.
 - 5. Provide polymer coating color chart for coating selection by Owner.

1.4 QUALITY CONTROL

- A. Shop welding shall be in conformance with the latest AWS standards, and no field welding shall be required.
- B. Wire gauges shall conform to American Steel and Wire Co. gauges.
- C. Bolts, washers, and nuts shall be galvanized steel in conformance with the requirements as specified in the State Standards.
- D. Mild steel bars and shapes shall conform to ASTM A36.
- E. Products from qualified manufacturers having a minimum of five years experience manufacturing Black Vinyl-Coated chain link fencing will be acceptable by the architect as

equal, if approved in writing, tens days prior to bidding, and if they meet the following specifications for design, size gauge of metal parts and fabrication.

PART 2 - MATERIALS

2.1 GENERAL

- A. All fencing and appurtenances shall be provided by a single manufacturer. All fencing and appurtenances shall be manufactured by "Master Halco, Inc." or approved equal.
- B. Products from qualified manufacturers having a minimum of five years experience manufacturing Black Vinyl-Coated chain link fencing will be acceptable as equal, if approved in writing, tens days prior to bidding, and if they meet the following specifications for design, size gauge of metal parts and fabrication.
- C. The overall height of ground-mounted fence shall be 6 feet as indicated on the Drawings.
- D. All fence components including, but not necessarily limited to, framework, hardware, fabric, gates and accessories shall be coated in black vinyl. New Posts and Framework shall be manufactured in accordance with ASTM MA120. Posts and framework shall be Schedule 40 steel pipe, standard weight, one piece without joints. Black Vinyl Coating shall be permafused coating 7 mils polyvinyl.
- E. Fence is not designed with Privacy Slats. If privacy slats are installed, fence hardware, posts, rails, shall be re-designed to withstand wind loads per the building code in this region.

2.2 CHAIN LINK FENCE FABRIC

- A. Fabric: 5/8-inch diamond mesh black vinyl coating steel wire, top and bottom edge knuckle selvage and closed, 9 gauge except as otherwise specified on drawings.
- B. Vinyl Coated Fabric: RR-F-191/1C type IV, ASTM F-668 class 26, color black, core wire gauge 9 with 7 mils polyvinyl permafused coating
- C. The fabric wire shall have a minimum breaking strength of 850 lbs. when tested per U.S. Government Spec. RR-F—191/1A.
- D. Fabric shall measure the height specified on the Drawings and be knuckled at top selvage and twisted and barbed at bottom selvage.
- E. Fabric shall be fastened to all rails and line posts by means of No. 6 gauge vinyl-coated wire ties spaced approximately 12 inches O.C. Fabric shall be fastened to end, corner, pull and gate posts by means of black vinyl-coated tension bars, held in place at 12-inch intervals by black vinyl-coated tension bar bands, nuts, and bolts. Tension bars shall be ¼ inch by ¾ inch and full height of fabric.

2.3 FRAMEWORK AND HARDWARE

- A. All framing and accessories shall be provided as required to complete the fence system.
- B. Posts and rails shall be Schedule 40 steel pipe, minimum yield strength of 30,000psi, black vinyl-coated, standard weight, one piece without joints, having the following approximate outside diameters, and minimum weights per linear foot:

1. Line Posts 2-1/2 inches @ 3.7 lbs.
2. End, Corner, and Pull Posts 4 inches @ 9.1 lbs.
3. Rails 1-5/8 inches @ 2.3 lbs.
4. Gate Posts 4 inches @ 9.1 lbs.

- C. Spacing between end, corner, pull, or line posts shall not exceed 10 ft 0-in. Posts of all types shall be of sufficient length to fully support fence fabric height and allow for installation to the depth of footing specified below ground level.
- D. Post tops shall be pressed steel or malleable iron, designed to exclude moisture from the posts and receive the top rail. All components shall be black vinyl-coated.
- E. The fence shall have a continuous top rail for its full length. The top rail shall pass through openings provided in the line post tops, and each length shall be coupled with an internal self-centering, swaged sleeve for a distance of 6 inches.
- F. Horizontal braces (brace rail) shall be provided where required at all pull, corner, and terminal posts midway between the top rail and ground, and shall extend from pull, corner, and terminal posts to the first adjacent line posts. Braces shall be securely fastened to the line posts, pull, corner, and terminal posts by rail ends and brace bands. Brace rails shall be galvanized steel, 1-5/8 inches outside diameter pipe, weighing not less than 2.3 pounds per linear foot with plain ends. Each corner and pull post shall be braced and trussed on two sides; each terminal post shall be braced and trussed on one side.
- G. Diagonal braces (truss rods) shall be provided with all horizontal braces and shall be trussed from the brace ends on the line post back to the bottom of pull, corner or terminal post. The diagonal brace rods shall be galvanized steel. Each brace rod shall be provided with a heavy malleable iron hot-dip zinc-coated turnbuckle to provide means for adjusting the tension in the diagonal brace.
- H. Black Vinyl Coating shall be provided on all fence components. Coating shall be permafused 7 mils thickness.

2.4 GATES

General

1. The fabric shall be of the same material as for fence, and shall be attached to the gate frame on all four sides by means of black vinyl-coated fasteners and tension bars.
2. For each gate, heavy hardware and accessories shall be provided and shall include hinges, latches, keepers, and gate stops as appropriate.

B. Gates

1. The gate shall be "freehanging" type, single leaf, and sized as shown on the Drawings. The gate manufacturer shall supply gates of appropriate construction, which will be structurally stable and meeting the intended dimensions. The gate shall be manufactured by Master Halco Inc. or approved equal.
2. The gate frame shall be constructed of 2-inch square aluminum tubing alloy 6063-T6, weighing 0.94 lbs per linear foot, welded at the joints. The combined track and top frame member shall be extruded aluminum-sized per manufacturer's recommendations. The bottom frame member shall be 2-inch by 4-inch aluminum tubing weighting 1.71 pounds per linear foot.
3. Support posts for the gate shall be of 4-inch outside diameter, Schedule 40 steel pipe, ASTM A-120, as specified above
4. Vertical uprights and diagonal truss rods shall be provided as necessary to insure rigidity of the gate frame and prevent sagging

5. Appurtenant hardware assemblies for each support post, latch assembly with provisions for padlocking, and gate stop assembly shall be provided.

C. Polymer Coating: As selected by Owner.

2.5 ACCESSORIES

- A. Chain link fence accessories: ASTM F 626 Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing. Fittings should match Master Halco specifications.
- B. Post caps: Formed steel or cast malleable iron weather tight closure cap for tubular posts. Provide one cap for each post. Provide tops to permit passage of top rail.
- C. Top rail and rail ends: Pressed steel per ASTM F626, for connection of rail and brace to terminal posts.
- D. Top rail sleeves: 7" expansion sleeve with a minimum .137" wire diameter and 1.80" length spring, allowing for expansion and contraction of top rail.
- E. Wire ties: 9 gauge [0.148"] galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge [0.092"] for rails and braces. Hog ring ties of 12-1/2 gauge [0.0985"] for attachment of fabric to tension wire.
- F. Brace and tension (stretcher bar) bands: Pressed steel, minimum 300 degree profile curvature for secure fence post attachment. At square post provide tension bar clips.
- G. Tension (stretcher) bars: One piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of 3/16" x 3/4". Provide tension (stretcher) bars where chain link fabric meets terminal posts.
- H. Tension wire: Galvanized coated steel wire, 7 gauge, [0.177"] diameter wire with tensile strength of 75,000 psi.
- I. Truss rods & tightener: Steel rods with minimum diameter of 5/16". Capable of withstanding a tension of minimum 2,000 lbs.
- J. Nuts and bolts are black vinyl coated.
- K. Polymer Coating: As selected by Owner.

PART 3 - EXECUTION

3.1 GENERAL

- A. Installation of permanent fencing shall not begin until completion of final grading within the loading and mechanical equipment area.
- B. Top rails and fabric bottom shall be approximately parallel to final surface grade, allowing no more than 6 inches clear distance between the fabric bottom and grade.
- C. Abrasions shall be touched up to the Owner's satisfaction by methods approved in writing by the Owner. The Owner reserves the right to require replacement of scratched or otherwise damaged fence components.

3.2 INSTALLATION OF POSTS

- A. Posts shall be set plumb, in proper alignment, and embedded in 3,000 psi concrete (State Standard Class A (AE)) unless otherwise specified on the plans or for temporary fencing. Holes for post footings shall be drilled in firm, undisturbed, or compacted soil. Concrete shall be placed in a continuous pour to the lines and elevations noted on the Drawings. Contractor shall install temporary guys, or braces, as may be required to support the posts in proper position until such time as the concrete has set sufficiently to anchor said posts. Concrete footings shall be carried to the depth and dimensions shown on the Drawings.
- B. Where rock is encountered within the required depth to which the post is to be erected, a hole of a diameter slightly larger than the largest dimension of the post shall be drilled into the rock and the post grouted in. The regular dimensioned concrete footing as shown on the plans shall then be placed between the top of the rock and required grade shown on the plans.
- C. All hollow pipe and tube type post shall be fitted with post tops. The bases of the post tops shall have flanges that fit around the outside of the posts and shall be secured.
- D. Pull posts shall be installed at all points of inflection greater than 30 degrees in the line of the fence and at all points of abrupt changes in grade.

3.3 INSTALLATION OF FABRIC

- A. The fabric shall be unrolled on the outside of the fence line with the bottom edge of the fabric against the posts. The various rolls shall be spliced to form a continuous mesh pattern by bringing the ends close together and weaving in a picket in such a way that will engage both ends of the rolls and catch, with each twist, each separate mesh of the picket of both rolls of fabric.
- B. At end, corner or gateposts, the stretcher bar shall be slipped through the end picket of the fabric and the stretcher bar bands at the same time. The bolts in the stretcher bar bands shall then be tightened. Additional rolls of fabric shall be spliced and placed as the erection progresses along the fence. In long sections, an intermediate pull post with horizontal braces and diagonal braces shall be provided every 500 feet.
- C. The fabric shall be placed by securing one end and applying sufficient tension to remove all slack before making attachments elsewhere. After the fabric has been stretched, it shall be attached to the line posts and rails with fabric ties spaced at 12 inches apart. The topmost clip shall be placed on the line post as near the top of the fabric as possible and lowest clip as near the bottom of the fabric as possible. At terminal sections (end, corner and pull) and gateposts, the fabric shall be fastened with stretcher bars and bands. The fastenings shall be spaced at 12 inches on centers for terminal sections (end, corner and pull) and gateposts. The topmost band shall be placed on these posts as near the top of the fabric as possible and the lowest band as near the bottom as possible.
- D. Before making a closure, the other end of the run shall be fastened to the end, corner, or gatepost as described previously. The operation of making a closure of a run shall be as follows. The stretching equipment shall be clamped on the ends of the fabric parallel to each other and about 5-feet apart when the tension is first applied. The stretching shall continue until the slack has been removed from both sections of the fabric. If the ends overlap, the fabric shall be cut to match. The ends shall be joined by the insertion of a picket similar to the methods of connecting two rolls of fabric.

3.4 INSTALLATION OF GATES

- A. Gates shall be installed plumb, level, and secure for full opening without interference. The gates shall be hung on gate fittings as shown on the plans. Gates shall be erected to open in the direction indicated and shall be provided with gate latches as shown on the drawings.

3.5 ADDITIONAL INSTALLATION

- A. Braces:
 - 1. When top rail is not used, braces shall be placed 12 inches down from the top of the terminal posts and shall extend from the terminal (end, corner, and pull) post and gate posts to the brace post. The braces shall be securely fastened to the post and trussed from brace post back to terminal post with round rod and turnbuckle, all as shown on the drawings.

3.6 INSPECTION, TESTS AND GUARANTEES

- A. The Owner shall have the right to inspect and test any materials or their fabrication at any time during construction at the mill, shop or field. At the option of the Owner, certified mill tests of materials may be accepted in lieu of tests.
- B. The Contractor shall furnish to the Owner, prior to installation, notarized certification and satisfactory guarantees by the fence manufacturer covering any faults and/or defects in any part of the fence arising from defective workmanship or materials for a period of one (1) year, and any rust and corrosion for twenty five (25) years, from the date of final acceptance of the project.

END OF SECTION

SECTION 329230

SEEDING FOR NON-LAWN AREAS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Provide all materials, equipment, and labor necessary to complete the work as indicated on the drawings or as specified herein.
- B. The principal work of this section includes, but may not be limited to the following:
 - 1. Application of seed.
 - 2. Acceptance of seeding.
- C. In general, seeded areas shall, at a minimum, include roadsides, yards and setbacks, meadows, marginal wetlands, and all other areas of site within project limit lines that have been disturbed or are barren unless otherwise noted on the plans. Overseeding of established lawn areas, if required on plans, shall also extend to project limit lines, unless otherwise noted.

1.3 RESTRICTIONS

- A. Prior to seeding, contractor shall clearly and plainly mark his limits as indicated on plans.
- B. No work shall be performed prior to field determination and approval from owners' representative.

1.4 QUALITY ASSURANCE

- A. Use a contractor who is fully experienced and qualified in such work.
- B. Each seed bag or container shall display a label which identifies the contents as a true representation of the seed mix and percentages required by specification. No seed shall be applied to a site until the Owner or Owner's Representative has determined the mixture meets all requirements.
- C. Do not make substitutions without written approval. If specified seed mixes are not available, obtain approval for substitution from the Owner or Owner's Representative.

1.5 SUBMITTALS

- A. Certifications and/or labels of proposed seed mixtures stating common and scientific names of grasses, percentages by weight, and percentages of purity and germination.

- B. Product information of all proposed weed control chemicals.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect all products from weather or other damaging or deteriorating conditions.
- B. Seed mixes which have been damaged or have deteriorated in transit or storage are not acceptable.
- C. Seeding Schedule: Prepare a proposed seeding schedule. Schedule dates for each type of landscape work during normal seasons for such work.

Seeding: August 15 - October 15

- D. Correlate with specified maintenance periods to provide maintenance to date of acceptance. Once the schedule is accepted, dates shall be revised and submitted in writing for reasons of delay.

1.7 WARRANTY

- A. Warranty seeding until final acceptance of grass stand.

1.8 MAINTENANCE

- A. Maintenance of seeding to be performed by the installer includes:
 1. Watering;
 2. Regrading and replanting eroded areas; and
 3. Seeding or patching sparse or bare areas.
- B. Maintain seeded areas immediately after placement until grass is accepted.

PART 2 - PRODUCTS

2.1 SEED

- A. General: Pure, live, fresh seed from commercial sources, meeting and labeled in accordance with State and Federal laws, rules, and regulations. All seed to have minimum germination rate of 85% unless otherwise noted.

2.2 WATER

- A. Potable water to establish and maintain a healthy stand of grass, see section 3.5A.

PART 3 - EXECUTION

3.1 GENERAL

- A. Seeded areas shall, at a minimum, include roadsides, yards and setbacks, meadows, marginal wetlands and all other areas of site within project limit lines that have been disturbed or are barren unless otherwise noted on the plans.

3.2 APPLICATION OF SEED

- A. The approved seed mixture shall be applied at a rate specified by each particular type of seeding, by means of seeder device capable of penetrating ground to depth of one inch (1"). Seeder machine shall be equipped with disc-type penetrating action and seeder tubes which plant seeds. Seeder machine shall be approved for use by Owner or Owner's Representative prior to seeding.
- B. Distribute seed over area in two separate passes, each one perpendicular to the other (north-south, east-west orientation). Each pass shall be in a linear progression, and shall conform to the field direction that permits the longest straight line application procedure.
- C. Hydro seeding will be permitted only with permission of Owner or Owner's Representative. All requests shall be in writing with detailed and itemized procedure to be followed.
- D. Broadcast seeding will be permitted only with permission of Owner or Owner's Representative. All requests shall be in writing with detailed and itemized procedure to be followed.

3.3 CARE OF SEEDED AREAS

- A. Watering: Contractor shall water all seeded areas within 72 hours of seeding operation. One additional watering may be required and will be at discretion of owner.
- B. Each cutting shall result in a stand of evenly mowed grass, three inches (3") tall immediately following the cutting. Neat trimming shall be necessary around all poles, trees, ledges, delineators, curbs, piers, abutments and other structures falling within the seeded areas; this trimming will be conducted simultaneously with the mowing during each cutting operation. All curbs shall be trimmed and exposed; all gutters will be left free of all grass clippings.

3.4 ACCEPTANCE OF SEEDING

- A. Provisional Acceptance
 1. Provisional acceptance period shall be defined as the elapsed time between application of seed and the establishment of a good, healthy, uniform growth of grass.
 2. Provisional acceptance will not occur until the seeded areas are well established; exhibiting a vigorous growing condition, devoid of bare spots greater than one (1) square foot.
 3. It will be the contractor's responsibility to maintain seeding areas in an approved condition until provisional acceptance.
 4. The Contractor shall keep all seeded areas watered and in good condition, reseeding if and when necessary during the provisional acceptance period.
 5. Watering of seeded areas:
 - a. During this period, water grass as necessary to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is the equivalent of

one inch (1") of absorbed water per week that is delivered at weekly intervals in the form of natural rain or is augmented by periodic watering.

6. It shall be the contractor's responsibility to obtain necessary documentation to show that provisional acceptance has been granted. This shall be done upon written request submitted by the contractor the landscape architect to inspect grass work on site. Provisional acceptance will not be granted until contractor has obtained, in writing, a statement from the landscape architect indicating that grass is satisfactory under the terms of the provisional acceptance.

B. Final Acceptance

1. Final acceptance period shall be defined as the elapsed time between provisional acceptance and final closeout of the project.
2. All seeded areas shall be guaranteed by the Contractor for not less than one growing season from the time of provisional acceptance. Growing season shall be defined as follows:
 - a. If provisional acceptance is received during April, May, June or July, next growing season shall end on October 15.
 - b. If provisional acceptance is received during September, October, November or December, next growing season shall end on June 1.
3. At the end of the guarantee period, inspection will be made by the Owner upon written request submitted by the Contractor at least ten (10) days before the anticipated date. Grass areas not demonstrating satisfactory stands as outlined above, (except if damaged by vandalism) as determined by the L.A., shall be renovated, re-seeded, and maintained, meeting all requirements as specified herein.
4. After all necessary corrective work has been completed, the Owner's Representative shall certify in writing the final acceptance of the grass area.
5. Decision of Owner as to the necessity to replace grass areas, or repair any defects on workmanship, or cause of any destruction or loss, impairment, or failure to flourish, shall be conclusive and binding upon Contractor. Replacements shall be the same as specified. All replacements shall be planted as specified herein at Contractor's expense.
6. "Vandalism", as noted above, is intended to mean any acts, whether intentional or accidental, by other persons, which clearly result in damage, and which may reasonably be considered to be beyond the Contractor's reasonable control, as determined by the Owner's Representative.

END OF SECTION

Division 33 – Utilities

SECTION 334000

STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. All work specified in this Section shall conform to "Standard Specifications for Road and Bridge Construction" of the Rhode Island Department of Transportation, latest revision, herein referred to as "State Standards".

1.3 SUMMARY

- A. This Section includes gravity-flow, nonpressure storm drainage, with the following components:
 - 1. Pipe
 - 2. Concrete Headwall

1.4 DEFINITIONS

- A. HDPE High Density Polyethylene.

1.5 SUBMITTALS

- A. The Contractor shall submit for approval, manufacturer's printed recommendations for the storage, protection, handling, installation and testing of stormwater piping, fittings and appurtenances, which shall be strictly adhered to by the Contractor.
- B. Shop Drawings: For the following:
 - 1. Pipe of all materials.
 - 2. Headwalls
- C. Record Drawings: All installed underground utilities shall be designated on as-built drawings by the contractor of record and provided to the Owner and Engineer in AutoCad electrical format prior to completion of the project. All as-built drawings, (underground and above ground) shall be dimensioned from permanent benchmarks such as existing buildings and include depths at various points throughout the extent of the work, and invert elevations at all structures.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe, pipe fittings, and seals from dirt and damage.

- B. Use only nylon-protected slings to handle pipe. The use of hooks or bare cables will not be permitted.
- C. Do not store HDPE piping and fittings in the sunlight for extended periods of time. Store pipe in accordance with manufacturer's recommendations.
- D. Ship rubber gaskets in cartons and store in a clean area away from grease, oil, ozone producing electric motors, heat and the direct rays of the sun.
- E. In case of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative at the Contractor's expense.
- F. Pipe, pipe fittings, and other associated appurtenances damaged during deliver handling or storage shall be replaced at no additional cost to the Owner.

1.7 PROJECT CONDITIONS

- A. The Contractor shall provide means of stormwater management during construction to control runoff and protect downstream areas from damage resulting from stormwater runoff.
- B. The Contractor is responsible for any damage resulting from stormwater runoff during construction, including damage from flooding.

PART 2 - PRODUCTS

2.1 HIGH-DENSITY POLYETHYLENE PIPE AND FITTINGS

- A. High-Density Polyethylene Pipe and fittings shall be ADS N-12 IB ST Smooth Interior Pipe, ADS N-12 IB ST High Capacity Large Diameter Pipe or approved equivalent. Joints shall be soil-tight and include a rubber gasket on the spigot end of the pipe. When installed into the bell end, the joint shall be sealed.
- B. Pipe shall conform to AASHTO M294 (Type 'S') for the specified diameters and strength classes.
- C. Pipe shall be rated to withstand H-20 Loading Criteria with 18" of cover.

2.2 FLEXIBLE PIPE COUPLINGS

- A. Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end as manufactured by Fernco Inc. or approved equivalent.

2.3 GEOTEXTILES

- A. Refer to Section 310000 for requirements regarding geotextile filter fabrics.

2.4 CONCRETE HEADWALL

- A. For pipes greater than 8" in diameter: headwall shall be in accordance with Section 709 and 808 of the RI Standard Specifications and per dimensions listed on the details.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 310000 "Earthwork."

3.2 PIPE INSTALLATION

- A. Reinforced Concrete Pipe: The method of joining reinforced concrete pipe sections shall be such that the ends are fully entered, and the inner surfaces are reasonably flush and even. Joints shall be made with rubber gaskets and Portland Cement grout. The completed joints shall be protected against rapid drying by suitable covering material.
- B. Use only nylon-protected slings to handle pipe. The use of hooks or bare cables will not be permitted.
- C. PVC Piping: No machinery shall directly contact the PVC pipe to push the pipe into place. The pipe shall be pushed into place by hand. The use of a hammer or mallet is permitted, with the use of a board to shield the end of the pipe being struck by the hammer. The pipe shall not be directly contacted with a hammer or mallet. Any pipe damaged while being pushed into place or while being laid in the trench shall be removed from the site and replaced at the expense of the Contractor.
- D. Pipe shall be inspected before any backfill is placed. Any pipe determined by the Owner's Representative to be out of alignment, unduly settled, or damaged shall be taken up and re-laid or replaced at no additional cost to Owner.
- E. General Locations and Arrangements: Drawing plans and details indicate location and arrangement of underground storm drainage piping. Install piping as indicated, following piping manufacturer's written instructions.
- F. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- G. If conflicts between utilities, the Contractor shall stop work on the utilities, contact the Engineer, and await direction from the Engineer.
- H. Install piping with 36-inch minimum cover unless otherwise specified on the Drawings.
- I. Install piping with a minimum slope as specified on Drawings.

3.3 PRECAST CONCRETE HEADWALL INSTALLATION

- A. For pipes greater than 8" in diameter: headwall shall be installed in accordance with Section 709 and 808 of the RI Standard Specifications.

3.4 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 - 1. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 - 2. The Contractor shall, at his own expense, replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - 3. The Contractor shall repair any defects or corrections required by the Owner's Representative.

3.5 CLEANING

- A. The Contractor shall clean interior of piping and structures of dirt, debris, and superfluous materials prior to commencing work, during construction and prior to acceptance of stormwater drainage system.
- B. The Contractor shall also clean downstream portions of the stormwater conveyance system which recovered silt deposits from the construction activity.

3.6 RECORD DRAWINGS

- A. All installed underground utilities shall be designated on as-built drawings by the contractor of record and provided to the Owner and Engineer in AutoCAD electrical format prior to completion of the project. All as-built drawings, (underground and above ground) shall be dimensioned from permanent benchmarks such as existing buildings and include depths at various points throughout the extent of the work, and invert elevations at all structures.

END OF SECTION

Appendices

Appendix A: Locus Map

Appendix B: RIDEM Insignificant Alteration Permit

1-2

Legend

- Limit of Disturbance
- ▭ Parcel Boundary
- ▭ FEMA Flood Hazard Areas



ANNOTATED AERIAL PHOTOGRAPH

SCALE: 1"=200'



8 BLACKSTONE VALLEY PLACE
LINCOLN, RI 02865
(401) 334-4100

10 LINCOLN ROAD, SUITE 210
FOXBORO, MA 02035
(508) 543-1755

**CAMP FOGARTY CULVERT REPLACEMENT
EAST GREENWICH, RI**



RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES
235 Promenade Street, Providence, Rhode Island 02908

April 11, 2019

Rhode Island Army National Guard
C/o Ann Marie Ethier
Schofield Armory
705 New London Avenue
Cranston, RI 02920

Insignificant Alteration – Permit

RE: Wetlands Application No. 19-0038 in reference to the property and proposed project located:

Approximately 425 feet east of Boesch Farm Road; approximately 690 feet northeast of the intersection of Boesch Farm and South Roads; Assessor's Plat 18, Lot 16, East Greenwich, RI.

Dear Ms. Ethier:

Kindly be advised that the Department of Environmental Management's ("DEM") Freshwater Wetlands Program ("Program") has completed its review of your **Request for Preliminary Determination** application. This review included a site inspection of the above referenced property ("subject property") and an evaluation of the proposed culvert replacement, road regrading, fence replacement, scour pad installation, and drainage swale installation within Camp Fogarty, as illustrated and detailed on site plans submitted with your application. These site plans were received by the DEM on February 14, 2019.

Our observations of the subject property, review of the site plans and evaluation of the proposed project reveals that alterations of freshwater wetlands are proposed. However, pursuant to 250-RICR-150-15-1.9 of the Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act, 250-RICR-150-15-1 (Rules), this project may be permitted as an **insignificant alteration** to freshwater wetlands under the following terms and conditions:

Terms and Conditions for Wetlands Application No. 19-0038:

1. This letter is the DEM's permit for this project under the R.I. Fresh Water Wetlands Act, Rhode Island General Laws § 2-1-18 et seq.
2. This permit is specifically limited to the project, site alterations and limits of disturbance as detailed on the site plans submitted with your application and received by the DEM on February 14, 2019. A copy of the site plans stamped approved by the DEM is enclosed. Changes or revisions to the project which would alter freshwater wetlands are not authorized without a permit from the DEM.
3. Where the terms and conditions of the permit conflict with the approved site plans, these terms and conditions shall be deemed to supersede the site plans.
4. You must notify this Program in writing immediately prior to the commencement of site alterations and upon completion of the project.

5. A copy of the stamped approved site plans and a copy of this permit must be kept at the site at all times during site preparation, construction, and final stabilization. Copies of this permit and the stamped approved plans must be made available for review by any DEM representative upon request.
6. Within ten (10) days of the receipt of this permit, you must record this permit in the land evidence records of the Town of East Greenwich and supply this Program with written documentation obtained from the Town showing this permit was recorded.
7. The effective date of this permit is the date this letter was issued. This permit expires four (4) years from the date of issue.
8. Any material utilized in this project must be clean and free of matter which could pollute any freshwater wetland.
9. Prior to commencement of site alterations, you shall erect or post a sign resistant to the weather and at least twelve (12) inches wide and eighteen (18) inches long, which boldly identifies the initials "DEM" and the application number of this permit. This sign must be maintained at the site in a conspicuous location until such time that the project is complete.
10. Temporary erosion and sediment controls detailed or described on the approved site plans shall be properly installed at the site prior to or commensurate with site alterations. Such controls shall be properly maintained, replaced, supplemented, or modified as necessary throughout the life of this project to minimize soil erosion and to prevent sediment from being deposited in any wetlands not subject to disturbance under this permit.
11. You are responsible for the proper operation, maintenance and stability of any mitigative features, facilities, and systems of treatment and control which are installed or used in compliance with this permit to prevent harm to adjacent wetlands until documentation is provided that this responsibility has been assigned to another entity.
12. You are obligated to install, utilize and follow all best management practices detailed or described on the approved site plans in the construction of the project to minimize or prevent adverse impacts to any adjacent freshwater wetlands and the functions and values provided by such wetlands.
13. All construction activities involving soil disturbances within watercourses must be limited to the low flow period (i.e., the period from July 1 to October 31 of any calendar year). Soil disturbance in these watercourses must temporarily cease in the event of any abnormally high stormwater runoff event during the low flow period.
14. The river bed shall be restored to its original condition upon completion of headwall installation.
15. Treatment of bypass water shall be required if the discharge is more turbid than the inflow.
16. Any dewatering basin shall be located within the approved limit of disturbance.
17. Cofferdams are to be located within the approved limit of disturbance.
18. This Program has made a specific revision to the approved site plans. This revision is clearly marked in red on the approved plans. This project must take place in compliance with this revision. Specifically, sediment controls are to be installed downstream of the existing roadway along the limit of disturbance to prevent sediment from entering the river channel.

Pursuant to the provisions in 250-RICR-150-15-1.9(A)(9) and 250-RICR-150-15-1.11(D), as applicable, any properly recorded and valid permit is automatically transferred to the new owner upon sale of the property.

Kindly be advised that this permit is not equivalent to a verification of the type or extent of freshwater wetlands on site. Should you wish to have the types and extent of freshwater wetlands verified, you may submit the appropriate application in accordance with 250-RICR-150-15-1.8(C).

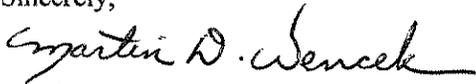
You are required to comply with the terms and conditions of this permit and to carry out this project in compliance with the Rules at all times. Failure to do so may result in an enforcement action by this Department.

In permitting the proposed alterations, the DEM assumes no responsibility for damages resulting from faulty design or construction.

This permit does not remove your obligation to obtain any local, state, or federal approvals or permits required by ordinance or law and does not relieve you from any duties owed to adjacent landowners with specific reference to any changes in drainage.

Please contact Daniel Kowal of this office (telephone: 401-222-4700, ext. 7416) should you have any questions regarding this letter.

Sincerely,



Martin D. Wencek, Permitting Supervisor
Freshwater Wetlands Program
Office of Water Resources

MDW/DMK/dmk

Enclosure: Approved site plans

ec: Carl Adamo, P.E., Pare Corporation