

**Technical Specifications
Proposed Tide Gate and Outlet Structure
Improvements
Great Creek Outlet Structure
Silver Sands State Park
Milford, Connecticut**

Prepared for
**Connecticut Department of Energy and
Environmental Protection**

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SECTION 01 20 49 – PAYMENT ITEMS SUMMARY

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

- A. This Section includes measurement and payment paragraphs for
 1. Base Bid payment items.

1.3 Definitions

- A. Payment Item: The Owner's distribution of the Contract Sum through listed work items.
 1. Each item is specified to include a defined scope of services. However, not all materials, labor, equipment, or services of a payment item are guaranteed to be listed or specified.
 2. Include costs associated with items of work required to complete the defined scope of services within the appropriately specified payment item.
 3. Payment items include all necessary material, plus cost for delivery, installation, applicable taxes, overhead, and profit.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 List of Payment Items

- A. Payment Item No. 1 – Mobilization/Demobilization
 1. The Work of this item shall be measured by the Lump Sum.
 2. Work associated with this item will be paid for at the Contract Lump Sum price for equipment mobilization and demobilization, temporary site fencing and security, traffic controls, safety measures, field office and facilities, field survey and engineering services, insurance, bonds, administrative and general requirements, and incidentals not covered by other bid items required to complete the work including materials, equipment, tools and labor incidental to the Work.

B. Payment Item No. 2 – Temporary Facilities

1. The Work of this item shall be measured by the Month.
2. Work associated with this item will be paid for at the Monthly price and includes:
 - a. Sanitary facilities, electric power, internet and telephone service including use charges.
 - b. Temporary roads and paving, project identification and temporary signs, waste disposal facilities, contractor/engineer shared field office, box culvert temporary lighting, box culvert ventilation and air monitoring, environmental protection, tree and plant protection, traffic control signs, barricades, warning signs, and lights.

C. Payment Item No. 3 – Pre-Construction Documentation

1. The Work of this item shall be measured by the Lump Sum.
2. Work associated with this item will be paid for at the Contract Lump Sum price and includes:
 - a. Water control plan
 - b. Construction progress schedule

D. Payment Item No. 4 – Erosion and Sedimentation Control

1. The Work of this item shall be measured by the Lump Sum.
2. Work associated with this item will be paid for at the Contract Lump Sum price and includes the following:
 - a. Construction entrance
 - b. Silt fence
 - c. Hay bales
 - d. Catch basin inserts
 - e. Dewatering bags
 - f. Dust control including sweeping of streets

E. Payment Item No. 5 – Water Control System

1. The Work of this item shall be measured by the Lump Sum.
2. Work associated with this item will be paid for at the Contract Lump Sum price and includes:
 - a. Delegated design and sequencing of the system
 - b. Flow diversion
 - c. Special linings for erosion protection

- d. Pipes, barriers
 - e. Sedimentation basins
 - f. Pre-fabricated sediment containment devices
 - g. Drawdown of water in work area
 - h. Dewatering of areas for construction of structures
 - i. Safe conveyance of water and flood flows
 - j. Protection of existing structures and work in progress during high water and significant rainfall
- F. Payment Item No. 6 – Temporary Cofferdam
- 1. The Work of this item shall be measured by the Lump Sum.
 - 2. Work associated with this item will be paid for at the Contract Lump Sum price including the following.
 - a. Delegated design and sequencing of the system
 - b. Preventing surface water from entering excavations
 - c. Installing support and protection systems without damage to site improvements
- G. Payment Item No. 7 – Site Clearing & Demolition
- 1. The Work of this item shall be measured by the Lump Sum.
 - 2. Work associated with this item will be paid for at the Contract Lump Sum price including the following.
 - a. Protecting existing trees and vegetation to remain.
 - b. Removing existing trees and other vegetation.
 - c. Clearing and grubbing.
 - d. Removing concrete head wall.
 - e. Removing timber training walls and piles.
 - f. Removing steel sheeting deadman, connecting cables/rods.
 - g. Removing fencing.
 - h. Interior repairs of existing box culvert.
 - i. Power-washing interior of existing tide gate structure and box culvert.
Off-site disposal of materials.
- H. Payment Item No. 8 – Excavation (Earthwork)
- 1. The Work of this item shall be measured by the Cubic Yard.

2. Work associated with this item will be paid for at the Contract Cubic Yard price including the following.
 - a. Excavating, stockpiling at the location indicated on the plans, providing suitable material, grading, and re-placing existing beach sand and tidal flat material to their points of origin.
 - b. Preparation of subgrade for structures.
 - c. Disposal of unsuitable material.
 - d. Disposal of surplus suitable material, if required.

- I. Payment Item No. 9 – Unsuitable Material (Earthwork)
 1. The Work of this item shall be measured by the Cubic Yard.
 2. Work associated with this item will be paid for at the Contract Cubic Yard price including the following.
 - a. Providing imported beach sand should it be required to achieve the finished grades shown on the drawings

- J. Payment Item No. 10 – Imported Beach Sand (Earthwork)
 1. The Work of this item shall be measured by the Cubic Yard.
 2. Work associated with this item will be paid for at the Contract Cubic Yard price including the following.
 - a. Providing imported beach sand should it be required to achieve the finished grades shown on the drawings

- K. Payment Item No. 11 – Precast Concrete
 1. The Work of this item shall be measured by the Lump Sum.
 2. Work associated with this item will be paid for at the Contract Lump Sum price including the following.
 - a. Plant-precast concrete box sections, headwall and cutoff wall.
 - b. Grouted intermediate riprap level spreader.

- L. Payment Item No. 12 – Metal Fabrications
 1. The Work of this item shall be measured by the Lump Sum.
 2. Work associated with this item will be paid for at the Contract Lump Sum price including the following.
 - a. Steel angles, channels, anchors, plates, fasteners and stiffeners for securing timber lagging to steel H piles, to end of box culvert extension, to headwall and cutoff wall, and to northeast side of proposed and existing box culverts.

- b. Steel plate fence post anchors that attach to top of the steel piles, headwall and box culvert.
 - c. All metals not specified elsewhere.

- M. Payment Item No. 13 – Steel “H” Piles
 - 1. The Work of this item shall be measured by the Lump Sum.
 - 2. Work associated with this item will be paid for at the Contract Lump Sum price including the following:
 - a. Steel “H” piles at the lengths, locations and driven to the elevations shown on the drawings.

- N. Payment Item No. 14 – Exterior Rough Carpentry
 - 1. The Work of this item shall be measured by the Lump Sum.
 - 2. Work associated with this item will be paid for at the Contract Lump Sum price including the following:
 - a. Tongue and groove timber lagging for training walls and northeast side of box culvert.

- O. Payment Item No. 15 – Chain Link Fence
 - 1. The Work of this item shall be measured by the Linear Foot.
 - 2. Work associated with this item will be paid for at the Contract Linear Foot price including the following:
 - a. Woven wire fencing, supported by metal posts, mounted on the training wall “H” piles, headwall, and the top of the box culvert along its northeast side.

- P. Payment Item No. 16 – Repair Schedule on Drawing CD-503
 - 1. The Work of this item shall be measured by the Lump Sum.
 - 2. Work associated with this item will be paid for at the Contract Lump Sum price for the work shown in the Repair Schedule on Drawing CD-503.

- Q. Payment Item No. 17 – Diver
 - 1. The Work of this item shall be measured by Time and Materials.
 - 2. Work associated with this item will be paid for from a Contract Allowance including the following:
 - a. Investigate miscellaneous underwater conditions to assist in the successful completion of the project.

- R. Payment Item No. 18 – Cast-in-Place 4,000 lbs. Marine Concrete
 - 1. The Work of this item shall be measured by the Cubic Yard.

2. Work associated with this item will be paid for at the Contract Cubic Yard price including the following:
 - a. It may be determined during construction by the Owner or the Engineer that concrete shall be used as a mud-mat foundation for the precast concrete cut-off wall, to provide additional support at the training wall/box culvert connection, or for support or protection at other locations.
 - b. Concrete shall be formed and reinforced with rebar.

END OF SECTION

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SECTION 01 20 50 - SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 Description

- A. The Schedule of Values will include quantity and prices of items aggregating the Contract Price and will subdivide the work into component parts in sufficient detail to serve as the basis for progress payments during construction.

1.2 Quality Assurance

- A. Not used.

1.3 Submittals

- A. A preliminary schedule of values for all of the work including quantities and prices of items for approval by Owner/Engineer. Prices will include overhead and profit applicable to each item of work.

PART 2 - PRODUCTS

- A. Not used.

PART 3 - EXECUTION

3.1 Format

- A. Schedule shall be typed on 8½ x 11 inch bond paper, and be prepared as a table with the following headings as a minimum:
- B.

Item	Item Number	Specification Section	Estimated Quantity	Value

- B. Contractor's standard forms may be considered by Owner upon request.
- C. Construction sequence shall determine order of listing for individual items.

3.2 Content

- A. Installed value of each major item of Work and each subcontracted item of Work shall be listed as a separate line item to serve as a basis for computing values for Progress Payments. All values to be rounded to nearest dollar.
- B. For each major subcontract, products and operations of that subcontract are to be listed as separate line items.
- C. Estimated quantities are to be included within each line item.
- D. Each line item shall include a directly proportional amount of Contractor's overhead and profit.
- E. On request, subcontractor schedules must be submitted.
- F. Following is a list of specific items to be included at a minimum in the Schedule of Values.
 - Construction Entrance
 - Silt Fence
 - Grouted Riprap Level Spreader
 - Bentonite Waterproofing
 - Exterior Rough Carpentry
 - Furnishing "H" Piles
 - Driving "H" Piles
 - Box Culvert Joint Repair
 - Box Culvert Concrete Spall Repair Type "A"
 - Box Culvert Concrete Spall Repair Type "B"

3.3 Substantiating Data

- A. When required by Owner, Bidder/Contractor shall submit data justifying line item amounts in question.

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities in staging and construction office/trailer areas.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 2. Electric power service.
 - 3. Internet service.
 - 4. Telephone service.
- C. Support facilities include, but are not limited to, the following:
 - 1. Temporary roads and paving.
 - 2. Project identification and temporary signs.
 - 3. Waste disposal facilities.
 - 4. Contractor/Engineer shared field office.
 - 5. Temporary box culvert lighting.
 - 6. Box culvert ventilation and air monitoring.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Environmental protection.
 - 2. Tree and plant protection.
 - 3. Traffic Control Signs, barricades, warning signs, and lights.

1.3 Use Charges

- A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Engineer and shall be included in the Work. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
 - 1. Owner.

2. Engineer.
 3. Testing agencies.

 4. Personnel of authorities having jurisdiction.
- B. Sewage Disposal Service: Pay sewage disposal service use charges for sewage disposal from Project site.
 - C. Potable Water Service: Pay potable water service use charges, whether metered or otherwise, for water used in construction activities at Project site.
 - D. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used in construction activities at Project site.
 - E. Internet Service: Pay internet service use charges, whether metered or otherwise, for on-line access used in construction activities at Project site.

1.4 Quality Assurance

- A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
 1. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

2.1 Materials

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Engineer. Provide materials suitable for use intended.
- B. Water: Potable.

2.2 Equipment

- A. General: Provide equipment suitable for use intended.
 1. Provide 2 self-contained toilet units, one for men and one for women.
- B. Field Office: Prefabricated mobile unit, maximum 30-foot length, with lockable entrances, operable windows, and serviceable finishes; tables, chairs, fireproof filing cabinet, and drafting table; thermostatically controlled heat and air conditioning.
 1. Heating: Maintain minimum temperature of 68 degrees F.

2. Cooling: Maintain maximum temperature of 72 degrees F.
- C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- D. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material for the exclusive use of the Engineer.
- E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
 1. Provide electric water coolers to dispense hot and cold water.
- F. Temporary Box Culvert Lighting: UL rated, suitable for use in wet locations.
- G. Box Culvert Ventilation and Air Monitoring: Equipment to properly ventilate and constantly monitor air quality while personnel are inside the box culvert structure. Gasoline and diesel powered equipment shall not be allowed to operate within or immediately upwind of the box culvert.

PART 3 - EXECUTION

3.1 Installation, General

- A. Locate facilities where designated on the Contract Drawings and where they will serve the Project adequately and result in minimum interference with performance of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 Temporary Utility Installation

- A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company requirements.
 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
 3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.

- B. Sanitary Facilities: Provide temporary toilets (one for men, one for women), wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 - 2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
- C. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period for the Engineer's office. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.
 - 1. Install power distribution wiring overhead and rise vertically where least exposed to damage.

3.3 Support Facilities Installation

- A. General: Comply with the following:
 - 1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
 - 2. Maintain support facilities until Substantial Completion. Remove at Substantial Completion.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate to support loads and to withstand exposure to traffic during construction period.
 - 1. Provide a reasonably level, graded, well-drained subgrade of satisfactory soil material, compacted to not less than 95 percent of maximum dry density in the top 6 inches.
 - 2. Provide gravel paving course of subbase material not less than 3 inches thick; roller compacted to a level, smooth, dense surface.
 - 3. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.
- D. Dewatering Facilities and Drains: Comply with requirements in applicable Division 2 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.

- E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste.
1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.
 2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type. Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.
- F. Engineer's Field Office: Provide an insulated, weather tight, air-conditioned area in the shared field office for use by the Engineer. Keep office clean and orderly. Provide weekly janitorial services.
1. Size: Sufficient to accommodate listed furniture without crowding, but no less than 300 square feet.
 - a. Windows: Three screened, operable windows with locks and curtains.
 - b. Door: Cylinder lock with keys in quantity requested by Engineer.
 2. Lighting: Overhead fluorescent lights.
 3. Furnish and equip offices as follows:
 - a. Office Desk with Drawers: 3 feet by 5 feet. Enclosed over desk shelving with suitable clearance to stand 3-ring-binders vertically. Built-in desktops may be substituted.
 - 1) Quantity: Two.
 - b. Office Desk Chair: Upholstered, adjustable, executive swivel armchair with casters.
 - 1) Quantity: Two.
 - c. Telephone and fax machine.
 - d. Desk Lighting: Fluorescent under-cabinet lighting for each unit.
 - e. Sloping Drafting Table: 3 feet by 6 feet with smooth top.
 - f. Drafting Table Chair: Upholstered, adjustable swivel chair with casters.
 - g. Folding Chairs: Upholstered seats.
 - 1) Quantity: Four.
 - h. Vertical Plan Rack: 8 binders minimum.
 - i. Metal Filing Cabinets: Fireproof, and lockable with key.
 - 1) Four Drawer: Letter or legal size.
 - a) Quantity: One.
 - j. Broom and dust pan.

- k. Photocopying machine with supply of toner and paper for duration of construction. Provide repair service if needed.

3.4 Security And Protection Facilities Installation

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise.
- B. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.
- C. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

3.5 Operation, Termination, and Removal

- A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
- B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the property of Contractor.
 - 2. Remove temporary gravel access roads and temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, guard rail and sidewalks at temporary entrances.
 - 3. Remove temporary gravel access roads.
 - 4. Following removal of the field office and temporary utilities, repair area to pre-construction condition.
 - 5. At Substantial Completion, clean and renovate permanent facilities used during construction period.

END OF SECTION

SECTION 01 57 13 – EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

- A. This Section includes furnishing, placing, and maintaining sedimentation control measures as shown on the Drawings, as directed by the Engineer, and where necessary to reduce sediment content of runoff. Measures include the following:

1. Silt Fence.
2. Erosion Control Hay Bales.
3. Dewatering bags.
4. Construction entrance.
5. Dust control.

- B. Related Sections include the following:

1. Division 2 Section "Earthwork."

1.3 Submittals

- A. Certificates of Compliance:

1. Silt fence

1.4 Quality Assurance

- A. Standard Specifications: "Form 816, Standard Specifications for Roads, Bridges and Incidental Construction, State of Connecticut, Department of Transportation" and supplements.
- B. Connecticut Guidelines for Soil Erosion and Sediment Control (SESC) by the Connecticut Council on Soil and Water Conservation.

PART 2 - PRODUCTS

2.1 Silt Fence

- A. Synthetic Filter Fabric: Woven geotextile, 36 inches maximum height, conforming to the following:

<u>Properties</u>	<u>Requirement</u>	<u>Unit</u>
Grab Tensile Strength (ASTM D4632):	124	Lbs
Grab Tensile Elongation (ASTM D4632):	15	Percent
Puncture Strength (ASTM D4833):	60	Lbs
Flow Rate (ASTM D4491):	10	Gal/Min/Sq. Ft.
UV Resistance(at 500 hours) (Retained strength) (ASTM D4355):	80	Percent

2.2 Posts

- A. Hardwood Stakes: 1.5-inch by 1.5-inch by 42-inches, minimum.

2.3 Silt Fence Fasteners

- A. Staples, tie wires or hog rings, as recommended by manufacturer.
1. Staples: Heavy-duty wire, 1-inch long minimum.

2.4 Hay Bales

- A. Bales: Hay, weighing 40 to 120 pounds per bale.
- B. Stakes: Wood, 1-inch by 1-inch by 36-inch minimum.

2.5 Sediment Dewatering Bag

- A. Filter Bag (Silt Bag): Manufactured non-woven geotextile fabric bag, sewn with high-strength thread, with a spout to accommodate a 4-inch discharge hose (maximum), and attached straps.
1. Available Product and Manufacturer:
 - a. Dirtbag® by ACF Environmental, Richmond, VA.
 - b. Dandy Dewatering Bag by Dandy Products, Inc., Dublin, OH.
 - c. Or equal.
 2. Geotextile Fabric:

<u>Properties</u>	<u>Test Method</u>	<u>Units</u>
Grab Tensile Strength	ASTM D4632	250 lbs
Puncture	ASTM D4833	165 lbs.
Flow Rate	ASTM D4491	70 Gal/Min/Sq. Ft.
Permittivity	ASTM D4491	1.3 sec-1
Mullen Burst	ASTM D3786	550 psi.
UV Resistance	ASTM D4355	70 percent
Apparent Opening Size	ASTM D4751	40 US Sieve
Percent Retained		100 percent

2.6 Construction Entrance

- A. Crushed Stone: Article M.01.01 NO. 4 of Form 816.

2.7 Dust Control

- A. Calcium Chloride: ASTM D98, Type 1 or Type 2.
- B. Water: Potable.

PART 3 - EXECUTION

3.1 General

- A. Minimize environmental damage during construction. Prevent discharge of fuel, oil, lubricants, and other fluids. Mitigate effects of discharge.
- B. Install erosion and sediment control measures prior to clearing, demolition or construction.
- C. Construct erosion and sediment control measures in accordance with standards and specifications of the Connecticut Soil Erosion and Sediment Control guidelines, local regulations, and as indicated.
 - 1. Attend a preconstruction meeting with the Engineer, to review permit conditions and construction methods.
 - 2. Provide additional sedimentation and erosion controls as required by the Engineer to address field conditions.
 - 3. Do not discharge turbid water directly from dewatering to inland wetlands or watercourses.
 - 4. Inspect site weekly and prior to any anticipated rain event. Ensure that erosion controls are properly maintained and functioning.

5. Supply a 24-hour contact name and number as part of the erosion control plan.
- D. Install additional control measures, if deemed necessary by the State, City, or Owner.
- E. Control dust and wind erosion. Control dust to prevent a hazard to traffic on adjacent roadways. Dust control includes sprinkling of water and uniform application of calcium chloride on exposed soils and haul roads.
- F. Do not discharge directly into wetlands or watercourses where dewatering is necessary. Utilize methods and devices as permitted by authorities having jurisdiction and appropriate regulations to minimize and retain suspended solids including pumping water into a temporary sedimentation bowl, providing surge protection at inlet and outlet of pumps, floating pump intake.
 1. If pumping operation results in turbidity problems, stop pumping until means of controlling turbidity are determined and implemented.
- G. Where control measures are required for longer than 60 days, use silt fence instead of hay bales.
- H. Cut Areas
 1. Establish an erosion control line (hay bale check or filter fabric) at toe of slope in cut areas and slope stabilization with mulch or grass within 30 days of start of cut operations.
- I. Fill Areas
 1. Establish an erosion control line (woodchip berm or filter fabric) approximately 10 feet from toe of slope of proposed fill areas prior to beginning fill installation.
 2. Initiate slope stabilization with mulch or grass within 30 days of start of fill installation.
- J. Within 7 days of completing slope construction, stabilize slopes with vegetation or matting to minimize exposure.
- K. Stockpiles
 1. Side Slopes: 2:1 maximum.
 2. Surround stockpiles by a sediment barrier.
- L. Final Grading
 1. If final grading is delayed for more than 30 days after land disturbances cease, stabilize soils with temporary vegetation or mulch.
- M. Planting Season for Temporary Vegetation
 1. March 1 to June 15 and August 1 to October 1.
 2. After September 15, stabilize areas with hay bale check, filter fabric, or woodchip mulch.
- N. Areas to Be Left Bare Prior to Finished Grading and Seeding (other than beach areas)

1. Within Planting Seasons
 - a. Temporarily seed with Perennial Ryegrass
 - b. Apply at a rate of 2 pounds per 1000 sq. ft. at a depth of 1/2 inch.
 - c. Where grass predominates, fertilize according to a soil test at a minimum application rate of one pound per acre.
2. Outside of Planting Seasons
 - a. Apply air-dried wood chip mulch, free of coarse matter.
 - b. Apply at a rate of 185 to 275 pounds per 1000 sq. ft.

3.2 Control System

- A. Silt Fence
 1. Install fencing at locations indicated on plans or where directed by the Engineer. Maintain pitch of 2 to 20 degrees, with inclination toward potential silt source.
 2. Install bottom 6 inches of fabric by trenching and burying the fabric into the notched ground.
 3. Drive posts into ground a minimum of 12 inches.
 4. Locate fabric splices at posts only. Provide 6-inch overlap and seal.
- B. Sedimentation Control Hay Bales
 1. Install at locations indicated on plans or where directed by the Engineer. Place hay bales lengthwise with ends tight abutting one another. Install bales with bindings located on the sides.
 2. Entrench bales 4 inches and backfill. Place backfill toward potential silt source.
 3. Secure in place with 2 stakes per bale and insert straw in voids between bales.

3.3 Sediment Dewatering Bags

- A. Install fabric filter bag so incoming water flows downhill or towards drainage system through the filter without creating erosion. Place filter bag on porous sublayer such as a hay bale bed, or in trucked, to maximize water flow through surface area of bag.
- B. Dispose of fabric bag when it can no longer efficiently filter sediment or pass water at a reasonable rate.

3.4 Dust Control

- A. Apply water and calcium chloride uniformly over the surface when dust becomes a nuisance or when directed by the Engineer.

3.5 Transport Of Wet Materials

- A. When moving wet materials, take necessary measures to retain liquids within the truck or other vehicle to prevent leakage.

3.6 Maintenance

- A. Control System
 - 1. Inspect control system immediately after each rainfall and daily during prolonged rainfall. Make repairs immediately.
 - 2. Remove and dispose of accumulated sediments when sediment reaches approximately one-third the height of the control system, or when directed by the Engineer.
 - 3. Replace control system promptly if fabric decomposes or system becomes ineffective prior to the expected usable life.
 - 4. Maintain or replace system until no longer necessary for the intended purpose.
- B. Construction Entrance
 - 1. Maintain in good condition throughout construction period.
 - 2. Sweep adjacent roadways daily to remove tracked material from pavement.

3.7 Removal

- A. Remove and dispose of control system after area stabilizes with new growth or as directed by the Engineer.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

- A. Section Includes:
 - 1. Steel angles, channels, anchors, plates, fasteners and stiffeners for securing timber lagging to steel H piles, to end of box culvert, to headwall and cutoff wall, and to northeast side of proposed and existing box culverts..
 - 2. Steel plate fence post anchors that attach to top of the steel piles.
 - 3. All metals not specified elsewhere.
- B. Related Sections:
 - 1. Division 3 Section "Precast Concrete Box Culvert" for installing anchor bolts, and other attachment hardware cast into concrete.

1.3 Performance Requirements

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.4 Submittals

- A. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- B. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.
- C. Welding certificates.

1.5 Quality Assurance

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.6 Project Conditions

- A. Field Measurements: The contractor shall be responsible for verification of all necessary measurements required to ensure the proper fit and finish of the completed work.

1.7 Coordination

- A. Coordinate installation of anchorages, plates, and other items for casting into concrete. Coordinate with precast concrete manufacturer for dimensions of the box culvert, headwall and cutoff wall and locations of anchors.

PART 2 - PRODUCTS

2.1 Metals, General

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 Ferrous Metals

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 Fasteners

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use.
 - 1. Provide stainless-steel fasteners for fastening stainless steel, aluminum and galvanized steel items.
- B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1 (A1).
- C. Anchor Bolts: Provide Type 304 Stainless Steel anchors with stainless steel nuts and washers, of dimensions indicated.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 Miscellaneous Materials

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- D. Concrete: Comply with requirements in Division 3 Section "Cast-in-Place Concrete for Dam Structures" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 4000 psi (20 MPa).

2.5 Fabrication, General

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with precast concrete manufacturer. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

PART 3 - EXECUTION

3.1 Installation, General

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
 - 1. For galvanized items, cutting, drilling, and fitting required for installing metal fabrications shall be completed prior to galvanization.
- B. Fit exposed connections accurately together to form hairline joints. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Field welding of galvanized components and fabrications is not allowed.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 Adjusting And Cleaning

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 05 50 01 - STEEL H PILES

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 Summary

- A. Section includes steel H piles.

1.3 Unit Prices

- A. General: See Division 1 Section "Unit Prices" for piles affected by unit prices.
- B. The Contract Sum: Base the Contract Sum on number and dimensions of piles indicated from tip to cutoff, plus not less than 12 inches of overlength for cutting piles at cutoff elevations.
- C. Work of this Section is affected as follows:
 - 1. Additional payment for pile lengths in excess of that indicated, and credit for pile lengths less than that indicated, will be calculated at unit prices stated in the Contract, based on net addition or deduction to total pile length as determined by the Engineer measured to nearest 12 inches.
 - a. Additional payment for splices required to extend pile lengths in excess of that indicated will be calculated at unit prices stated in the Contract.
 - 2. Additional payment for number of piles in excess of that indicated, and credit for number of piles less than that indicated, will be calculated at unit prices stated in the Contract.
 - 3. Unit prices include labor, materials, tools, equipment, and incidentals for furnishing, driving, cutting off, capping, and disposing of cutoffs.
 - 4. Test piles that become part of permanent foundation system will be considered as an integral part of the Work.
 - 5. No payment will be made for rejected piles, including piles driven out of tolerance, defective piles, or piles damaged during handling or driving.

1.4 Submittals

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For steel piles. Show fabrication and installation details for piles, including details of driving points, splices, and pile caps.

1. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 2. Include arrangement of static pile reaction frame, test and anchor piles, equipment, and instrumentation. Submit structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Qualification Data: For qualified Installer.
- D. Welding certificates.
- E. Mill Test Reports: For steel H piles, signed by manufacturer.
- F. Pile-Driving Equipment Data: Include type, make, and rated energy range; weight of striking part of hammer; weight of drive cap; and, type, size, and properties of hammer cushion.
- G. Pile-Driving Records: Submit within three days of driving each pile.
- H. Field quality-control reports.
- I. Preconstruction Photographs: Photographs or video of existing conditions of adjacent construction. Submit before the Work begins.

1.5 Quality Assurance

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
1. Installer's responsibility includes engaging a qualified professional engineer to prepare pile-driving records.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Pre-installation Conference: Conduct conference at the project site.

1.6 Delivery, Storage, And Handling

- A. Deliver piles to Project site in such quantities and at such times to ensure continuity of installation. Handle and store piles at Project site to prevent buckling or physical damage.

1.7 Project Conditions

- A. Protect structures, underground utilities, and other construction from damage caused by pile driving.

- B. Preconstruction Photographs: Inventory and record the condition of adjacent structures, underground utilities, and other construction. Provide photographs or video of conditions that might be misconstrued as damage caused by pile driving.

PART 2 - PRODUCTS

2.1 Steel H Piles

- A. High-Strength, Low-Alloy, Nickel, Copper, Phosphorous Steel H Piles: ASTM A 690/A 690M.
- B. Driving Points: Manufacturer's standard one-piece driving point, fabricated from steel castings as follows to provide full bearing of web and flange of pile tip:
 - 1. Carbon-Steel Castings: ASTM A 27/A 27M, Grade 65-35.
 - 2. High-Strength Steel Castings: ASTM A 148/A 148M, Grade 80-40.
- C. Splice Unit: Manufacturer's standard splice unit, fabricated from two connected steel plates, of same material as H pile or material of equal strength, shaped to encase web and part of each flange.

2.2 Fabrication

- A. Fabricate and assemble piles in shop to greatest extent possible.
- B. Pile-Length Markings: Mark each pile with horizontal lines at 12-inch intervals; label the distance from pile tip at 60-inch intervals. Maintain markings on piles until driven.
- C. Fabricate full-length piles to eliminate splicing during driving, with ends square.
- D. Fabricate full-length piles by splicing lengths of H pile together. Accurately mill meeting ends of piles and bevel for welding. Maintain axial alignment of pile lengths. Maintain structural properties of pile across splice.
 - 1. Splice Units: Notch web of pile, fit splice unit into position, and weld according to manufacturer's written instructions and AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.
 - 2. Continuously Welded Splices: Splice piles by continuously welding according to AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.
 - 3. Splice piles during fabrication or field installation.
- E. Fit and weld driving points to tip of pile according to manufacturer's written instructions and AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.

PART 3 - EXECUTION

3.1 Driving Equipment

- A. Pile Hammer: Air-, steam-, hydraulic-, or diesel-powered type capable of consistently delivering adequate peak-force duration and magnitude to develop the ultimate capacity required for type and size of pile driven and character of subsurface material anticipated.
- B. Hammer Cushions and Driving Caps: Between hammer and top of pile, provide hammer cushion and steel driving cap as recommended by hammer manufacturer and as required to drive pile without damage.
- C. Leads: Use fixed, semi-fixed, or hanging-type pile-driver leads that will hold full length of pile firmly in position and in axial alignment with hammer.

3.2 Driving Piles

- A. General: Continuously drive piles to elevations indicated on the drawings. Establish and maintain axial alignment of leads and piles before and during driving.
- B. Heaved Piles: Re-drive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.
- C. Driving Tolerances: Drive piles without exceeding the following tolerances, measured at pile heads:
 - 1. Location: 1 inch from location indicated after initial driving, and 2 inches after pile driving is completed.
Plumb: Maintain a maximum of 1 inch from vertical, measured from the bottom of timber lagging to top of pile.
- D. Withdraw damaged or defective piles and piles that exceed driving tolerances and install new piles within driving tolerances.
 - 1. Fill holes left by withdrawn piles using cohesionless soil material such as gravel, broken stone, and gravel-sand mixtures. Place and compact in lifts not exceeding 72 inches.
 - 2. Fill holes left by withdrawn piles as directed by the Engineer.
- E. Abandon and cut off rejected piles as directed by Architect. Leave rejected piles in place and install new piles in locations as directed by Architect.
- F. Cutting Off: Cut off tops of driven piles square with pile axis and at elevations indicated.
- G. Pile-Driving Records: Maintain accurate driving records for each pile. Include the following data:
 - 1. Project name and number.

2. Name of Contractor.
3. Pile location in pile group.
4. Sequence of driving in pile group.
5. Pile dimensions.
6. Ground elevation.
7. Elevation of tips after driving.
8. Final tip and cutoff elevations of piles.
9. Records of re-driving.
10. Elevation of splices.
11. Type, make, model, and rated energy of hammer.
12. Weight and stroke of hammer.
13. Type of pile-driving cap used.
14. Cushion material and thickness.
15. Actual stroke and blow rate of hammer.
16. Time, pile-tip elevation, and reason for interruptions.
17. Number of blows for every 12 inches of penetration, and number of blows per 1 inch for the last 6 inches of driving.
18. Pile deviations from location and plumb.
19. Preboring, jetting, or special procedures used.
20. Unusual occurrences during pile driving.

3.3 Disposal

- A. Remove withdrawn piles and cutoff sections of piles from site and legally dispose of them off Owner's property.

END OF SECTION

SECTION 06 10 63 - EXTERIOR ROUGH CARPENTRY

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

- A. Section Includes:
 - 1. Tongue and groove timber lagging for training walls and northeast side of box culvert.
- B. Related Requirements:
 - 1. Section 05 50 00 "Metal Fabrications"
 - 2. Section 05 50 01 "Steel H Piles"
 - 3. Section 31 20 00 "Earthwork"
 - 4. Section 33 42 16 "Precast Concrete Box Culvert"

1.3 Definitions

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. RIS: Redwood Inspection Service.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPA: Western Wood Products Association.

1.4 Action Submittals

- A. Product Data: For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

1.5 Informational submittals

- A. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained. Preservative must be safe for human contact.
- B. Certificates of Inspection: Issued by lumber grading agency for exposed wood products not marked with grade stamp.
- C. Evaluation Reports: For preservative-treated wood products, from ICC-ES.

1.6 Quality Assurance

- A. Timber Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

1.7 Delivery, Storage and Handling

- A. Store materials under cover and protected from weather, sun and contact with damp or wet surfaces. Stack timber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 Timber, General

- A. Comply with DOC PS 20 and with grading rules of timber grading agencies certified by ALSC's Board of Review as applicable. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by ALSC's Board of Review.
 - 1. Factory mark each item with grade stamp of grading agency.
 - 2. For items that are exposed to view in the completed Work, mark grade stamp on end or back of each piece.
 - 3. All timber shall be provided to the dimensions indicated on the drawings (dimensions on the drawings are the actual finished dimensions). Provide sizes required by DOC PS 20 for moisture content specified.
 - 4. Provide dressed timber, S4S, unless otherwise indicated.
- B. Certified Wood: Timber shall be certified as "FSC Pure" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- C. Maximum Moisture Content:
 - 1. 19 percent.

2.2 Timber

- A. Hand select wood for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.
- B. Timber: Select Structural No. 1. grade of the following species:
 - 1. Southern yellow pine; SPIB.

2.3 Preservative Treatment

- A. Pressure treat timber with waterborne preservative according to AWPA U1; Use Category UC4a for items in contact with the ground.
- B. Pressure treat timber with waterborne preservative safe for human contact according to AWPA U1; Use Category UC4a.
- C. Preservative Chemicals: Safe for human contact. Acceptable to authorities having jurisdiction.
 - 1. Do not use chemicals containing arsenic or chromium.
- D. Use process that includes water-repellent treatment.
- E. After treatment, re-dry to 19 percent maximum moisture content.
- F. Mark treated wood with treatment quality mark of an inspection agency approved by ALSC's Board of Review.
- G. Application: Treat all timber.

PART 3 - EXECUTION

3.1 Installation, General

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.
- B. Minimum cut height at tapered end of top timber shall be 2 inches.
- C. Do not splice timber between supports.
- D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of members.

END OF SECTION

SECTION 07 17 00 -BENTONITE WATERPROOFING

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 Summary

- A. Section Includes:
 - 1. Bentonite waterproofing for exterior box culvert joints.
- B. Related Sections:
 - 1. Section 31 20 00 "Earthwork"
 - 2. Section 31 52 00 "Temporary Cofferdam"
 - 3. Section 33 42 16 "Precast Concrete Box Culvert"
 - 4. Section 35 80 12 "Water Control"

1.3 Action Submittals

- A. Product Data: For each type of product indicated. Include product specifications and manufacturer's written installation instructions.
- B. Shop Drawings: Show installation details for interface with other work.
- C. Samples: For each of the following products, in sizes indicated:
 - 1. Waterproofing: 6 inches square.

1.4 Informational Submittals

- A. Material Certificates: For each type of bentonite waterproofing, from manufacturer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for bentonite waterproofing.
- C. Warranty: Sample of special warranty.

1.5 Quality Assurance

- A. Source Limitations: Obtain bentonite waterproofing system from single source from single manufacturer. Obtain accessory products used with bentonite waterproofing from sources acceptable to bentonite waterproofing manufacturer.
- B. Preinstallation Conference: Conduct conference at Project site.

1.6 Delivery, Storage and Handling

- A. Deliver materials to Project site in manufacturer's original unopened and undamaged containers.
- B. Store materials in a dry, well-ventilated space.
- C. Remove and replace bentonite materials that have been prematurely exposed to moisture.

1.7 Project Conditions

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions, and tides permit bentonite waterproofing to be installed according to manufacturers' written instructions and warranty requirements.
 - 1. Do not apply waterproofing materials to surfaces where ice or frost is visible. Do not apply bentonite waterproofing materials in areas with standing water.
 - 2. Placing bentonite clay products in panel or composite form on damp surfaces is allowed if approved in writing by manufacturer.

1.8 Warranty

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree(s) to repair or replace components of bentonite waterproofing system that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 -PRODUCTS

2.1 Geotextile/Bentonite Sheets

- A. For saltwater conditions, Contaminant-Resistant Geotextile/Bentonite Waterproofing: Minimum of 1.0 lb/sq. ft. of bentonite clay granules specially formulated for use in saltwater or contaminated ground water, between two layers of geotextile polypropylene fabric, one woven and one nonwoven, needle punched and heat fused together.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carlisle Coatings & Waterproofing; CCW MiraCLAY EF.
 - b. CETCO; Voltex CR.
 - c. Tremco; Saltwater Paraseal
2. Grab Tensile Strength: 95 lbf according to ASTM D 4632.

2.2 Installation Accessories

- A. Granular Bentonite: Sodium bentonite clay containing a minimum of 90 percent montmorillonite (hydrated aluminum silicate), with a minimum of 90 percent passing a No. 20 (0.85-mm) sieve.
- B. Bentonite Mastic: Trowelable consistency, bentonite compound, specifically formulated for application at joints and penetrations.
- C. Granular Bentonite Tubes: Manufacturer's standard 2-inch-(50-mm-) diameter, water-soluble tube containing approximately 1.5 lb/ft. (2.2 kg/m) of bentonite; hermetically sealed; designed specifically for placing on wall footings at line of joint with exterior base of wall.
- D. Termination Bar: Extruded-aluminum or formed-stainless-steel bars with upper flange to receive sealant.
- E. Plastic Protection Sheet: Polyethylene sheeting complying with ASTM D 4397; thickness recommended by waterproofing manufacturer to suit application but at least 6 mils (0.15 mm) thick.
- F. Cement Grout Patching Material: Manufacturer's recommended grout mix compatible with substrate being patched.
- G. Masonry Fasteners: Case-hardened nails or hardened-steel, powder-actuated fasteners. Depending on manufacturer's written requirements, provide 1/2-or 1-inch-(13-or 25-mm-) diameter washers under fastener heads.
- H. Sealants: As recommended in writing by waterproofing manufacturer. Comply with requirements specified in Division 7 Section "Joint Sealants."
- I. Tapes: Waterproofing manufacturer's recommended tape for joints between sheets, membranes, or panels.
- J. Adhesive: Water-based adhesive used to secure waterproofing to both vertical and horizontal surfaces.
- K. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced asphaltic core, pressure laminated between two asphalt-saturated fibrous liners, and as follows:
 1. Thickness: 1/4 inch, nominal.

- L. Geotextile Protection Course: As recommended by waterproofing manufacturer.

PART 3 -EXECUTION

3.1 Examination

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate preparations affecting performance of bentonite waterproofing.
- B. Verify that substrate is complete and that work that will penetrate waterproofing is complete and rigidly installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

- A. Coordinate work in the vicinity of waterproofing to ensure proper conditions for installing the waterproofing system and to prevent damage to waterproofing after installation.
- B. Formed Concrete Surfaces: Remove fins and projections. Fill voids, rock pockets, form-tie holes, and other defects with bentonite mastic or cement grout patching material according to manufacturer's written instructions.
- C. Horizontal Concrete Surfaces: Remove debris, standing water, oily substances, mud, and similar substances that could impair the bonding ability of concrete or the effectiveness of waterproofing. Fill voids, cracks greater than 1/8 inch, honeycomb areas, and other defects with bentonite mastic or cement grout patching material according to manufacturer's written instructions.
- D. Excavation Support and Protection System: If water is seeping, use plastic protection sheets or other suitable means to prevent wetting the bentonite waterproofing. Fill minor gaps and spaces 1/8 inch wide or wider with wood, metal, concrete, or other appropriate filling material. Cover or fill large voids and crevices with cement mortar according to manufacturer's written instructions.

3.3 Installation, General

- A. Install waterproofing and accessories according to manufacturer's written instructions.
 - 1. Apply granular bentonite around penetrations in horizontal surfaces and changes in plane according to manufacturer's details in preparation for granular bentonite tubes and mastic.
 - 2. Apply granular bentonite tubes, bentonite mastic, or both at changes of plane, construction joints in substrate, projections, and penetrations.
- B. Apply granular bentonite tubes continuously on footing against base of wall to be waterproofed according to manufacturer's written instructions.
- C. Protect waterproofing from damage and wetting before and during subsequent construction operations. Repair punctures, tears, and cuts according to manufacturer's written instructions.

- D. Install protection course before backfilling or placing overburden when recommended by waterproofing manufacturer.

3.4 Geotextile/Bentonite Sheet Installation

- A. General: Install a continuous layer of waterproofing sheets directly against concrete on both sides of the proposed box culvert exterior top and side joints, and the existing box culvert top and side joints exposed during construction. Bottom joints shall not be waterproofed. Sheets shall be 24 inches wide and be centered on the joint. Overlap ends of sheets a minimum of 6 inches.
- B. Concrete Walls: Starting at bottom of wall, apply waterproofing sheets vertically with primary backing side against wall. Secure with masonry fasteners spaced according to manufacturer's written instructions. Extend to bottom of culvert and secure.
 - 1. Termination at Bottom of Box Culvert: Apply sealant to bottom edge of waterproofing.

3.5 Field Quality Control

- A. Inspection: Arrange for manufacturer's representative to inspect waterproofing system prior to any portion being covered with other construction. Inspect completed waterproofing installation before covering with other construction and provide written report that installation complies with manufacturer's written instructions and that system warranty is accepted and will be honored by the manufacturer at the time of Substantial Completion of the Project.
 - 1. Remove and replace applications of bentonite waterproofing where inspection indicates that it does not comply with specified requirements.

END OF SECTION 07 17 00

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

- A. This Section includes the following:
 - 1. Protecting existing trees and vegetation to remain.
 - 2. Removing existing trees and other vegetation.
 - 3. Clearing and grubbing.
 - 4. Removing, repairing or cleaning existing site appurtenances including but not limited to the following:
 - a. Concrete head wall.
 - b. Timber training walls and piles.
 - c. Steel sheeting deadman, connecting cables/rods.
 - d. Fencing.
 - e. Interior repairs of existing box culvert.
 - f. Cleaning interior of existing tide gate structure and box culvert.
 - 5. Off-site disposal of materials.
- B. Limits of Work: Minimize disturbance within clearing limits. Perform only as much clearing as required to complete the Work.
- C. Related Sections include the following:
 - 1. Division 31 Section "Erosion and Sedimentation Control" for temporary control systems including silt fence, hay bales, and construction entrance requirements.
 - 2. Division 31 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.

1.3 Definitions

- A. Critical Root Zone (CRZ): Cylindrical area with a diameter 10 times the DBH including the soil within this area to a depth of 3 feet.
- B. Diameter at Breast Height (DBH): Diameter of tree to be protected located 4.5 feet above existing finish grade.

- C. Existing 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 than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.
- D. Tree Protection Zone (TPZ): 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.

1.4 Material Ownership

- A. Cleared materials not reused on the site shall become Contractor's property and shall be removed from Project site.

1.5 Submittals

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

1.6 Quality Assurance

- A. Preconstruction Meeting: Conduct meeting with Engineer and on-site supervisor and Review the following:
 - 1. Clearing limits.
 - 2. Trees and vegetation to be protected.
 - 3. Location of tree protection zones.
 - 4. Tree removal marking system and requirements

1.7 Project Conditions

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Protect-In-Place Existing Site Improvements: Support and protect in place existing site improvements. Items include existing boardwalk, railroad embankment, underground utilities, poles, wires, property line marker, retaining walls, and other structures. Restore items promptly; do not leave until end of construction.

- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.
- E. Restore items and surfaces damaged by construction operations to existing condition or better.

PART 2 - PRODUCTS

2.1 Soil Materials

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earthwork."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 Preparation

- A. To extent possible, protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Videotape existing conditions of adjacent structures including abutting residences, driveways, outbuildings, and East Broadway and Samuel A. Smith Lane for a distance of 200 feet in both directions from the site access drive.
- C. Locate and clearly flag trees and vegetation to remain or to be relocated.
- D. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 Tree and Vegetation Protection

- A. Erect and maintain temporary fencing around tree and vegetation protection zones before starting site clearing. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, or excavated material within fenced area.
 - 2. Do not permit vehicles, equipment, or foot traffic within fenced area.
 - 3. Maintain fenced area free of weeds and trash.
- B. Do not excavate within tree and vegetation protection zones, unless otherwise indicated.

- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
- D. Cultivated Hedges, Shrubs and Plants
 - 1. Protect in place; or temporarily relocate, maintain and replant after construction has been substantially completed, in their original positions.
- E. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Engineer.
 - 1. Employ an arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
 - 2. Replace trees that cannot be repaired and restored to full-growth status, as determined by Engineer.
 - 3. Replace vegetation with injuries that diminish beauty or affect growth or usefulness with similar species and quality.

3.3 Utilities

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Engineer not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Engineer's written permission.

3.4 Clearing And Grubbing

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
 - 4. Use only hand methods for grubbing within tree protection zone.
 - 5. Chip removed tree branches and stockpile in areas approved by Engineer.

- B. Fill depressions caused by clearing and grubbing operations with soil material approved by the Engineer unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.5 Site Improvements

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

3.6 Demolition

- A. Demolition materials shall become the Contractor's property unless indicated otherwise.
- B. Demolition materials shall be stockpiled in the Staging Area until they are removed for disposal.

3.7 Disposal

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 31 20 00 – EARTHWORK

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

- A. This Section includes the following:
 - 1. Excavating, stockpiling at the location indicated on the plan, providing suitable material, grading, and re-placing existing beach sand and tidal flat material to their points of origin.
 - 2. Preparation of subgrade for structures.
 - 3. Disposal of unsuitable material.
 - 4. Disposal of surplus suitable material, if required.
- B. Related Sections include the following:
 - 1. Division 31 Section "Site Clearing" for site stripping, grubbing, removing topsoil, and protecting trees to remain.
 - 2. Division 31 Section "Temporary Cofferdam."

1.3 Definitions

- A. Excavation: Removal of material encountered above subgrade elevations.
 - 1. Additional Excavation: Excavation below subgrade elevations as directed by Engineer. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
- B. Imported Beach Sand: Imported sand used to restore the beach to pre-construction beach elevations should fill be required. It shall meet the gradation requirements in this specification.
- C. Processed Aggregate Base: Processed material placed under structures to provide support and promote drainage.
- D. Structures: Footings, foundations, training walls, piles, box culverts, head walls, cutoff walls, fences, steel sheeting and associated tie-rods/cables, slabs, tanks, curbs, mechanical and electrical

appurtenances, or other man-made stationary features constructed above or below the ground surface.

- E. Subgrade: Surface or elevation remaining after completing excavation.

1.4 Submittals

- A. Product Data: For the following:
 - 1. Geotextiles.
 - 2. Processed aggregate.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance with the following with requirements. Prepare separate reports for each type and application of material.
 - 1. Gradation in accordance with ASTM D 422.
 - 2. Laboratory compaction data according to ASTM D 1557.
 - 3. Origin of material.
- C. For Record Purposes.
 - 1. Dewatering Plan: Comply with Division 31 Section "Temporary Cofferdam," Division 31 Section "Erosion & Sediment Control," and Division 35 Section "Water Control."

1.5 Quality Assurance

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock testing, as documented according to ASTM D 3740 and ASTM E 548.
- B. State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges and Incidental Construction, Form 816.

1.6 Project Conditions

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Engineer not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Engineer's written permission.
 - 3. Contact "*Call Before You Dig*" before excavating. Proceed with excavation only after utility locator service completes marking of utility locations.
- B. Demolish and completely remove from site existing structures indicated to be removed. Coordinate with utility companies to shut off services if underground utility lines are active.

PART 2 - PRODUCTS

2.1 Materials

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Free of debris, waste, frozen materials, vegetation, clay and other deleterious matter; adequately graded for satisfactory compaction.
- C. Imported Beach Sand: Meeting the following gradation requirements with a Plasticity Index equal to zero.

<u>U.S. Standard Sieve Size</u>	<u>Percent Passing by Weight</u>
No. 4	100
No. 10	90 – 100
No. 30	40 – 90
No. 100	0 – 50
No. 200	0 - 5

- D. Processed Aggregate Base: CDOT Form 816, Sections 3.04.01, 3.04.02 and 3.04.03.

2.2 GEOTEXTILES

- A. Woven Geotextile: Mirafi 600X or approved equivalent for soil separation between stone fill and underlying materials, and for separation of anti-tracking apron stone and subgrade.

PART 3 - EXECUTION

3.1 GENERAL

- A. All materials shall be installed in accordance with applicable ASTM standards and manufacturers instructions.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

- B. Protect subgrade and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

3.3 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
- B. No excavation shall take place until all protective measures are in place, including installation of the temporary cofferdam and dewatering filtration basin.
- C. Excavation shall be to the grades indicated on the Plans. The elevations of the excavated area shall be verified in the field in the presence of the Engineer.
- D. Excavated material shall be stockpiled where shown on the plans. Excavated beach sand and tidal flat material, the approximate location and limits of which are shown on the drawings, shall be stockpiled separately, then re-placed and compacted in their respective points of origin.

3.4 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrade, and from flooding or damaging Project site and surrounding area.
- B. Protect excavations, backfills, fills and subgrade 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. Provide positive drainage of backfill and fill.
 - 2. Install a dewatering system to keep subgrade dry and convey ground water away from excavations. Maintain dewatering until structures, pipes and appurtenances will not be damaged by surface or ground water. Maintain until dewatering is no longer required.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for installing services and other construction, and for inspections.
 - 1. Excavations for cutoff wall and box culvert: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing material.

3.6 APPROVAL OF SUBGRADE

- A. Notify Engineer when excavations have reached required subgrade.

- B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrade.
- D. Reconstruct subgrade damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer.

3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under cutoff wall or box culvert with lean concrete.
 - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Engineer.

3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials where shown on the plans. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Prevent windblown dust.
- B. Stockpile excavated beach sand and tidal flat material, the approximate location and limits of which are shown on the drawings, where shown on the drawings.

3.9 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade.
 - 2. Removing trash and debris.
 - 3. Removing temporary shoring and bracing, and sheeting.

3.10 FILL

- A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.
- B. Place and compact fill material in layers to required elevations.
- C. Re-place and compact stockpiled excavated beach sand and tidal flat material in their respective points of origin. Their approximate pre-construction locations and limits are shown on the drawings.
- D. Provide imported beach sand to achieve proposed grades.

3.11 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill 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.

3.12 COMPACTION OF BACKFILL AND FILL

- A. Place backfill and fill materials in layers not more than 12 inches in loose lift thickness for material compacted by heavy compaction equipment, and not more than 6 inches in loose lift thickness for material compacted by hand-operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. Under structures, scarify and proof roll top 12 inches of existing subgrade and compact each layer of Processed Aggregate to 95 percent.
 - 2. Under landscaped or beach areas, compact each layer of backfill or fill material to 85 percent.

3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Match existing grades.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

3.14 FIELD QUALITY CONTROL

- A. Testing Agency: The Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Testing agency is to inspect and test subgrade and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

- C. Box Culvert, Cutoff Wall and Grouted Riprap subgrade: At least one test of each soil stratum is to be performed to verify design bearing capacities. Subsequent verification and approval of other subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.
- D. Testing agency shall 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. Processed Aggregate Base: At least one test for each 500 square feet, but no fewer than two tests.
 - 2. Beach Sand Areas: At least one test for each 1,000 square feet of each lift.
- E. When testing agency reports that subgrade, fill, or backfill has 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.

3.15 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 the specified 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 Engineer; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, 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 the greatest extent possible.

3.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 31 52 00 – TEMPORARY COFFERDAM

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

- A. Section includes the designing, furnishing, installing, maintaining and removing of a temporary cofferdam in the approximate location indicated on the Drawings.
 - 1. The Contractor is responsible for control of water to enable construction in the dry.
- B. Related Sections:
 - 1. Division 31 Section "Erosion and Sediment Control."
 - 2. Division 31 Section "Water Control."

1.3 Performance Requirements

- A. Design, furnish, install, monitor, and maintain cofferdam support and protection system capable of resisting hydrostatic pressure loads.
 - 1. Delegated Design: Design cofferdam support and protection system, including comprehensive engineering analysis by a qualified professional engineer licensed in the State of Connecticut, using performance requirements and design criteria indicated.
 - 2. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 3. Install support and protection systems without damaging existing site improvements adjacent to excavation.
 - 4. Design cofferdam and pipe to accommodate normal tide levels plus an allowance to cover waves, wakes, storms and other uncertainties.

1.4 Submittals

- A. Product Data: For each type of product indicated.
 - 1. Include manufacturer's materials and installation information.
- B. Shop Drawings: For cofferdam support and protection system.
- C. Delegated-Design Submittal: For cofferdam support and protection system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the

qualified professional engineer, licensed in the State of Connecticut, responsible for their preparation.

D. Dewatering Plan

1. Include drawings with written descriptions of the proposed procedures for de-watering and disposal of the fluidized materials. Provide detailed information of the proposed temporary cofferdam system's materials, dimension, layout and pumping plan including the type of pump(s), capacity, sump detail, dewatering pit construction, location, weir elevation, and other measures and equipment as required for the complete system.

E. Qualification Data: For qualified Installer.

F. Field quality-control reports.

1.5 Quality Assurance

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Pre-installation Conference: Conduct conference at Project site.

1. Review methods and procedures related to cofferdam support and protection system including, but not limited to, the following:
 - a. Proposed excavation.
 - b. Proposed equipment.
 - c. Monitoring of support and protection system.
 - d. Working area location and stability.
 - e. Removal of cofferdam support and protection system.

1.6 Project Conditions

- A. This site is exposed to daily tidal flow with normal water elevation changes shown in the construction drawings. The site is also exposed to wind-driven waves and higher water elevations.
- B. Conform to all Federal, State and local laws, ordinances and permits for the manner in which excavations and trenches are dewatered and maintained.

PART 2 - PRODUCTS

2.1 Cofferdam System, General

- A. Provide a temporary cofferdam to enable the de-watering of the construction area for completion of all waterward work. The temporary cofferdam shall be for normal water levels plus a contingency for flood water elevations.

1. The Contractor shall have full responsibility for the structural and protective adequacy of the temporary cofferdam system. The Contractor shall be aware that some instances may occur where the water level may exceed the protection provided by the cofferdam.
2. Minimum Capacity of Conveyance Structures: Verify that the 48" pipe shown on the drawings is adequate to convey normal flows.
3. Design system to prevent blockage of system by debris including trees, branches, boats, docks, and ice.
4. Evaluate need for larger minimum capacity due to Project factors including construction duration and risk of damage to structure.

PART 3 - EXECUTION

3.1 General

- A. All sediment and erosion control measures shall be in place prior to the commencement of the construction for the temporary cofferdam.
- B. Notify the Owner 48 hours in advance of the delivery and on-site erection of the temporary cofferdam system.
- C. Maintain a safe, clean and accessible construction site. Provide for the complete and proper diversion of water during all stages of the project and repair, at no additional expense to the Owner, any damage to any equipment, materials or work caused by floods, high water or failure of the diversion of protective works.
- D. Construct cofferdam to provide adequate clearances in all directions as required for the execution of work to be performed in the de-watered area, including room for de-watering pumps, and installation and removal operations.
 1. The indicated cofferdam layout is a minimum layout and it may be necessary to increase the length of the cofferdam depending on the construction methodology and existing conditions.

3.2 Dewatering

- A. Cofferdam System Dewatering
- B. After installation of cofferdam system, pump out the water behind the cofferdam.
 1. Water shall be pumped to the dewatering filter basin.
 2. Locate and seal minor leaks.
- C. Dewatering After Start of Construction. Pump water into a temporary dewatering filtering basin before discharging into the Sound.

- D. Temporary sump holes may be installed within the area to be de-watered to create a more suitable pumping area. Pumps shall be capable of de-watering in accordance with the cofferdam manufacturer's directions at a faster rate than tidal water enters the area.
- E. Keep pumps in a workable condition. Maintain a spare pump on-site for breakdowns or emergency conditions.
- F. Incorporate proper sediment control methods to insure no sediment-laden or discolored water is discharged to the adjacent land and water.

3.3 Removal

- A. Notify the Owner 48 hours in advance prior to removing any portion of the temporary cofferdam system.
- B. Upon completion, inspection, and acceptance of the internal dry work, remove the temporary cofferdam
 - 1. Remove and dispose of upstream sandbags off-site.
 - 2. Check the ground surface for any stray objects, and dispose all surplus and unsuitable material from the site in accordance with Local, State and Federal rules.
 - 3. Restore disturbed areas.

END OF SECTION

SECTION 32 31 13 - CHAIN LINK FENCE

PART 1 - GENERAL

1.1 Summary

- A. Work under this Section shall consist of furnishing and installing woven wire fencing, supported by metal posts, erected where indicated on the Drawings or as ordered, and in conformity with these Specifications.

1.2 Quality Assurance

- A. Where "Form 816" is used, it shall mean "State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816" and issued supplements.

1.3 Submittals

- A. Submit manufacturer's certification demonstrating compliance with specifications for Chain Link Fence.

PART 2 - PRODUCTS

2.1 General

- A. Materials for this Work shall conform to the requirements of Form 816, Article M.10.05, and shall be galvanized, black PVC-coated steel fabric, posts, rails and hardware.

PART 3 - EXECUTION

3.1 General

- A. Space posts as indicated.
 - 1. Provide pull posts with two braces for changes in horizontal or vertical alignment of 10 degrees or more.
 - 2. Attach to piles and headwall as indicated on the drawings.
- B. Fasten braces to posts by suitable connections, and truss from line post back to post requiring bracing with 3/8-inch round rod, having a turnbuckle adjustment.
- C. Pass top rail through base of line post cap and form a continuous brace from end to end of fence. Provide rail with couplings approximately every 20 feet.
 - 1. Couplings: Outside-sleeve type, 7 inches long minimum, with one in every five couplings having a heavy spring to take up expansion and contraction in top rail.

- D. Fasten fabric to line posts with bands or wire clamps of No. 6 gage aluminized steel wire 4-3/4 inches long. Space bands approximately 14 inches apart.
 - 1. Fasten fabric to top and bottom rail with tie wires, 6-1/4 inches long, spaced approximately 24 inches apart.

END OF SECTION

SECTION 33 42 16 - PRECAST CONCRETE

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

- A. This Section includes the following:
 1. Plant-precast concrete box sections, headwall and cutoff wall.
 2. Grouted intermediate riprap level spreader.

1.3 Performance Requirements

- A. Structural Performance: Provide precast concrete units and connections capable of withstanding design loads within limits and under conditions indicated.

1.4 Submittals

- A. Product Data: For precast concrete box section.
- B. An affidavit of Compliance that the product(s) to be provided comply with the requirements of this Specification including any and all guarantees. These include, but are not limited to the following:
 1. Concrete materials.
 2. Reinforcing materials.
 3. Admixtures.
 4. Concrete mixes.
 5. Gaskets.
- C. Shop Drawings: Field verify existing box culvert wall, floor and ceiling thicknesses, joint configuration and inside dimensions prior to preparing shop drawings. Match existing dimensions. Detail fabrication and installation of precast concrete units. Indicate locations, plans and profiles, dimensions, shapes, cross sections, openings, joint details, inverts, pick points, and types of reinforcement, including size, spacing and concrete cover. Shop drawings shall bear the stamp of a professional structural engineer registered in the state in which the Project is located and shall be submitted prior to the production of the precast components.

1. Detail entire precast box section including special sections, as needed.
 2. Detail loose and cast-in hardware, inserts, connections, and joints, including accessories.
 3. Indicate handling devices, and lifting and supporting points.
 4. Comprehensive engineering analysis signed and sealed by the qualified professional engineer responsible for its preparation.
 - a. If computerized calculations are submitted, manuals for the software utilized shall be submitted with the calculations.
 - b. Inventory and operating load rating analysis utilizing the Load Factor Method for the HS20 design vehicle, including summary sheet and back-up calculations, bearing the stamp of a professional structural engineer registered in the state in which the Project is located, submitted prior to the production of the precast components.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of engineers/architects and owners, and other information specified.
- E. Manufacturer's quality control test results verifying that precast components were manufactured in accordance with these Specifications.

1.5 Quality Assurance

- A. Installer Qualifications: An experienced installer who has completed precast concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Fabricator Qualifications: A firm that complies with the following requirements and is experienced in manufacturing precast concrete units similar to those indicated for this Project and with a record of successful in-service performance.
1. Precaster must be CTDOT Approved.
 2. Assumes responsibility for engineering precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
 3. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of precast concrete that are similar to those indicated for this Project in material, design, and extent.

4. Participates in PCI's Plant Certification program and is designated a PCI-certified plant for Group C1.
 5. Has sufficient production capacity to produce required units without delaying the Work.
- C. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Design Standards: Comply with ACI 318 and the design recommendations of ASTM C1433 and PCI MNL 120, "PCI Design Handbook--Precast and Prestressed Concrete."
- E. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products."
- F. Product Options: Drawings indicate size, profiles, and dimensional requirements of precast concrete units and are based on the specific types of units indicated. Other fabricators' precast concrete units complying with requirements may be considered.

1.6 Delivery, Storage, And Handling

- A. Deliver precast structural concrete units to Project site in such quantities and at such times to ensure continuity of installation. Store units at Project site to prevent cracking, distorting, warping, staining, or other physical damage, and so markings are visible.
- B. Lift and support units only at designated lifting and supporting points as shown on Shop Drawings.

1.7 Sequencing

- A. Furnish anchorage items to be embedded in other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 Precast Components

- A. Precast components, including headwall and cutoff wall, shall be of the size and configuration as shown on the Plans and shall include weep holes, lifting rungs, inserts and other items incidental thereto in the quantities, sizes, lengths, types and configurations necessary or indicated on the Plans for a complete installation.

- B. The precast concrete box shall be a four (4) sided section, with open ends, to be monolithically cast of reinforced concrete. The inside surfaces shall be smooth so as not to restrict flow through the completed installation. 45 degree fillets shall be monolithically cast in all four (4) inside corners. Each joint shall have a male and female end with not less than one and one-half (1 1/2) inch concrete overlap. Each section shall have one (1) preplaced one (1) inch diameter neoprene gasket cemented to joint surface. Assembly hardware shall be supplied to lift and draw sections together to assure an adequate seal. No more than four (4) lifting holes or fixtures shall be located in each box section.
- C. The precast box culvert, headwalls, wingwalls, and footings shall be designed in accordance with the latest revision of ACI 318, Load Factor Design method and for AASHTO HS20 live load and impact as applicable; depth of cover as applicable. Minimum concrete cover shall be as noted.
- D. Design and construction of precast concrete box culverts shall conform to the latest revision of AASHTO M 273.

2.2 Reinforcing Materials

- A. Epoxy-Coated Reinforcing Bars: ASTM A 775 or ASTM A 934, as follows:
 - 1. Steel Reinforcement: ASTM A 615, Grade 60, deformed.
- B. Epoxy-Coated-Steel Welded Wire Fabric: ASTM A 884, Class A coated, deformed.
- C. Supports: Manufacturer's bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place according to CRSI's "Manual of Standard Practice," PCI MNL 116, and as follows:
 - 1. For uncoated reinforcement, use all-plastic or CRSI Class 1 plastic-protected bar supports.

2.3 Precast Concrete Materials

- A. Portland Cement: ASTM C 150, Type I, Type II, or Type III, of same type, brand, and source.
- B. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33.
 - 1. Fine Aggregate: Natural sand.
 - 2. Coarse Aggregate: Well-graded crushed stone, 3/4 inch maximum.
- C. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
- D. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

- E. Water-Reducing Admixture: ASTM C 494, Type A.
- F. Retarding Admixture: ASTM C 494, Type B.
- G. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
- H. High-Range, Water-Reducing Admixture: ASTM C 494, Type F or Type G.
- I. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
- J. Plasticizing Admixture: ASTM C 1017.

2.4 Precast Concrete Mixes

- A. Prepare design mixes for each type of concrete required.
- B. Design mixes may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast concrete fabricator's option.
- C. Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318.
- D. Normal-Weight Concrete: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi.
 - 2. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content of 4 to 7 percent.
- E. Other Admixtures: Use water-reducing, high-range water-reducing, water-reducing and accelerating, or water-reducing and retarding admixtures according to manufacturer's written instructions.
- F. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.5 Joints

- A. Neoprene Gaskets: ASTM C433.

2.6 Fabrication

- A. Units: Monolithically precast units. ASTM C1433.

1. Dimensions: As indicated.
 2. Joints: Watertight.
 3. Ends of Units: Male and female ends for each unit.
 - a. Joint Overlap: 6 inches minimum.
 - b. Gasket: Factory-installed 1-inch gasket at male end.
- B. Formwork: Accurately construct forms, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes. Maintain formwork to provide completed precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances.
1. Coat surfaces of forms with bond-breaking compound before reinforcement is placed. Provide commercial-formula, form-coating compounds that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces requiring bond or adhesion. Apply in compliance with manufacturer's written instructions.
- C. Cast-in openings larger than 10 inches in diameter or 10 inches square according to Shop Drawings. Smaller holes may be field cut by trades requiring them, as approved by Engineer.
- D. Reinforcement: Comply with recommendations in CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete.
 2. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete-placement operations. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, and hangers, as required.
 3. Place reinforcement to obtain at least the minimum coverage for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
 4. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Mix concrete according to PCI MNL 116 and requirements in this Section. After concrete batching, no additional water may be added.

- F. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units. Comply with requirements in PCI MNL 116 for measuring, mixing, transporting, and placing concrete.
 - 1. Slump: Between 5- and 8-inches.
- G. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items. Use equipment and procedures complying with PCI MNL 116.
- H. Comply with ACI 306.1 procedures for cold-weather concrete placement.
- I. Comply with ACI 305R recommendations for hot-weather concrete placement.
- J. Identify pickup points of precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint casting date on each precast concrete unit on a surface that will not show in finished structure.
- K. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture.
- L. Product Tolerances: Fabricate precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 product tolerances and the following:
 - 1. Internal and External Unit Dimensions: Plus or minus 1/2-inch.
 - 2. Slab and Wall thickness: Minus 1/4-inch.
 - 3. Length of Unit: Plus or minus 1/2-inch.
- M. Finish formed surfaces of precast concrete as indicated for each type of unit, and as follows:
 - 1. Standard Finish: Normal plant-run finish produced in forms that impart a smooth finish to concrete. Small surface holes caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls will be tolerated. Major or unsightly imperfections, honeycombs, or structural defects are not permitted.
- N. Screed finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections.

2.7 Bagged Stone

- A. Bagged Stone: Furnish and place crushed stone or gravel in burlap bags at the inlet ends of the weep holes. Arrange bags to form a cube with an overall dimension of 2'x2'x2' unless noted other

wise on the plans. The bag shall be of burlap and shall be large enough to contain loosely 1 cubic foot of stone. The stone for this item shall conform to the following requirements:

1. The crushed stone or gravel for bagged stone shall conform to one of the following gradations:

Sieve Size	No. 3 (2" Aggregate)	No. 4 (1 1/4" Aggregate)
2 1/2"	100	-----
2"	90-100	100
1 1/2"	35-70	90-100
1"	0-15	20-55
3/4"	----	0-15

2.8 Source Quality Control

- A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 116 requirements.
- B. Strength of precast concrete units will be considered deficient if units fail to comply with PCI MNL 116 requirements, including the following:
 1. Units fail to comply with compressive-strength test requirements.
 2. Reinforcement of units do not comply with fabrication requirements.
 3. Concrete curing and protection of units against extremes in temperature fail to comply with requirements.
 4. Units are damaged during handling and erecting.
- C. Testing: If there is evidence that the strength of precast concrete units may be deficient or may not comply with PCI MNL 116 requirements, Owner will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42.
 1. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by Engineer.
 2. Cores will be tested, after immersion in water, in a wet condition per ACI 301 if units will be wet under service conditions.
 3. Cores will be tested in an air-dry condition per ACI 301 if units will be dry under service conditions.
 4. Strength of concrete for each series of 3 cores will be considered satisfactory if the average compressive strength is equal to at least 85 percent of the 28-day design compressive

strength and no single core is less than 75 percent of the 28-day design compressive strength.

5. Test results will be made in writing on the same day that tests are performed, with copies to Engineer, Contractor, and precast concrete fabricator. Test reports will include the following:
 - a. Project identification name and number.
 - b. Date when tests were performed.
 - c. Name of precast concrete fabricator.
 - d. Name of concrete testing agency.
 - e. Identification letter, name, and type of precast concrete unit or units represented by core tests; design compressive strength; type of break; compressive strength at break, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
- D. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mix that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.
- E. Dimensional Tolerances: Units with dimensions smaller or larger than required and not complying with tolerance limits may be subject to additional testing.
 1. Precast concrete units with dimensions larger than required will be rejected if the appearance or function of the structure is adversely affected or if larger dimensions interfere with other construction. Repair or remove and replace rejected units, as required, to comply with construction conditions.
- F. Defective Work: Precast concrete units that do not comply with requirements, including strength, pressure test, manufacturing tolerances, and finishes, are unacceptable. Replace with precast concrete units that comply with requirements.

2.9 Grouted Intermediate Riprap Level Spreader

- A. Woven Geotextile: Mirafi 600X or approved equivalent for soil separation between stone fill and underlying materials, and for separation of anti-tracking apron stone and subgrade.
- B. Processed Aggregate Base: CDOT Form 816, Sections 3.04.01, 3.04.02 and 3.04.03.
- C. Intermediate Riprap: CDOT Form 816, Sections 7.03.01, 7.03.02 and 7.03.03.
- D. Grout: 3500 lbs concrete. Aggregate size may be modified to allow concrete to be pumped. Submit modified pumping mix to Engineer for review and approval.

PART 3 - EXECUTION

3.1 Examination

- A. Examine substrates and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

- A. Install precast concrete units in accordance with manufacturer's written instructions.
- B. Keep excavations dry during installation of units.
- C. Lay sections to proper grade and alignment to provide continuous inverts and to insure a watertight joint.
- D. Remove and reinstall misaligned units, or units with improperly closed joints.
- E. Replace units damaged by improper storing, transportation or handling at no additional cost.

3.3 Guarantee

- A. The design of the precast components shall be guaranteed. The quality of workmanship of the precast components shall be guaranteed for five (5) years, minimum.

3.4 Grout For Intermediate Riprap Level Spreader

- A. Place grout in the dry by hand. Work grout into voids between riprap using hand tools if necessary, to a minimum depth of 10 inches. Approximately 6 inches of the angular portion of the top of the riprap shall remain exposed over and above the 10 inches worked into the voids.
- B. Grout must cure for a minimum of 24 hours before being exposed to water.

END OF SECTION

SECTION 35 80 12 – WATER CONTROL SYSTEM

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

- A. This Section includes the following:
 - 1. Temporary water control measures and systems, other than cofferdams and associated pipe, including design and sequencing of proposed system, construction, installation, maintenance, and removal of temporary protective facilities and appurtenances required to convey surface or subsurface water beyond or around the work area. Temporary measures and appurtenances may include:
 - a. flow diversions;
 - b. special linings for erosion protection;
 - c. pipes;
 - d. barriers;
 - e. sedimentation basins; and
 - f. pre-fabricated sediment containment devices.
 - 2. Drawdown of water in work area.
 - 3. Dewatering of areas for construction of structures.
 - 4. Safe conveyance of water and flood flows.
 - 5. Protection of existing structures and work in progress during significant rainfall and high water.
- B. Construct water control system in phases as required to maintain a minimum tidal flow in both directions (ebb and flow) and to protect existing structures.
- C. Related Sections include the following:
 - 1. Division 31 Section "Earthwork" for excavating and backfilling.
 - 2. Division 31 Section "Site Clearing" for demolition.
 - 3. Division 31 Section "Temporary Cofferdam."

1.3 Definitions

- A. Conveyance Structures: Temporary systems for conveying normal water flows between Great Creek and Long Island Sound.

1.4 Performance Requirements

- A. Design, furnish, install, monitor, and maintain water control system capable of supporting and resisting hydrostatic pressure and flood flow. Include system or measures to protect adjacent homes from flood damage resulting from construction activities.
 - 1. Provide professional engineering services needed to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis.
- B. Install water control system without damaging existing structures.
- C. Alternative water control methods will be considered, providing proposed methods conform to applicable local, state and federal codes; will not require an extension of contract time; and will not result in increase of construction costs.
 - 1. The Engineer is not obligated to accept alternative methods and may impose additional requirements as condition of acceptance.

1.5 Submittals

- A. Water Control System Plan to be submitted to and approved by the Project Manager, shall include but not limited to:
 - 1. Materials.
 - 2. Schedule of operations.
 - 3. Method for controlling water.
 - 4. Method for crossing water courses.
 - 5. Emergency plan.
 - 6. List of emergency contact personnel and 24-hour contact number(s).
 - 7. Submit field-required modifications to approved water control plan to Engineer, prior to actual construction of modification.
- B. Shop Drawings for Information: Prepared by or under the supervision of a qualified professional engineer. Include plans, sections, details of water control system and accessory items, and locations of discharge lines.
- C. Photographs or video, sufficiently detailed, of existing conditions of adjoining construction and site improvements before installation of water control system, and after drawdown.

PART 2 - PRODUCTS

2.1 Materials

- A. General: Provide materials that are either new or in serviceable condition, and utilize manufactured items for their intended use.
- B. Cofferdam: Use sheet piles, or PortaDam or equivalent as approved by Engineer.

- C. Sand: Clean, inorganic, well-graded, granular material with 100 percent passing a 1-inch sieve.
- D. Sandbags: Burlap or polypropylene, approximately one cubic yard capacity.

PART 3 - EXECUTION

3.1 General

- A. Do not begin Work within creek until water levels have been lowered, water diversion has been achieved and maintained.

3.2 Preparation

- A. Investigate and verify existing surface and subsurface ground water conditions at each site.
- B. Evaluate type of protective facility, appurtenances, and measures required. Develop and submit Water Control System Plan.

3.3 Protection

- A. Maintain personnel and equipment on-site during flood watches, flashflood watches and flood warnings to mitigate potential damage during flood events.

3.4 Water Control

- A. Construct water control system of cofferdams or other methods accepted by the Engineer, to allow construction of permanent structures and repairs.
 - 1. Design devices for intended use and anticipated soil and water pressures. Provide watertight seals with devices where required, to prevent damage, water seepage, piping erosion, or collapse.
 - 2. Provide erosion and sedimentation controls to ensure no sediment is discharged to downstream areas.

3.5 Maintenance

- A. Monitor water control system daily. Promptly correct seepage, breakage, or other evidence of movement to ensure that water control system remains stable.
- B. Provide additional materials, equipment and manpower, as required, to resist damage to or failure of temporary water control measures and existing structures.

3.6 Removal And Repairs

- A. Correct movements or failures of temporary protection facilities and appurtenances, which prevents proper completion of permanent work, or damages existing structures and downstream areas.
- B. Remove water control systems when permanent construction has progressed sufficiently to accommodate hydrostatic pressures. Remove in stages to avoid damage to structures.

1. Repair or replace adjacent work damaged or displaced by construction operations at no additional cost.

END OF SECTION