

REQUEST FOR BID PROPOSALS
FOR
GREAT RIVER PARK IMPROVEMENT PROJECT

301 East River Drive, East Hartford, CT

BID NO. 26-05



Owned by: TOWN OF EAST HARTFORD
DEPARTMENT OF PUBLIC WORKS
740 MAIN STREET
EAST HARTFORD, CT 06108

Park Operator: RIVERFRONT RECAPTURE, INC.

Designer: GEI CONSULTANTS, INC.

NOTICES TO CONTRACTOR

NOTICE TO CONTRACTOR – REFERENCED SPECIFICATIONS

State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges, and Incidental Construction, Form 818, dated 2020, including the latest supplemental, referred to herein as the "Standard Specifications," are incorporated into the work of this Contract by reference and shall be made a part of these Contract Documents with regard to only the method and manner of performing the work, or the quantities and qualities of materials to be furnished under the Contract. Basis of Payment and Method of Measurement are specifically excluded from the Contract Documents. References to "State" contained within Form 818, shall be understood to mean "Town".

While the entirety of Form 818 is incorporated by reference, the majority of the Work of this Project can be found in the following Sections:

- ▶ 1.5.06 Coordination with Utilities
- ▶ 1.5.07 Coordination of Work by Other Parties
- ▶ 4.06 Bituminous Concrete
- ▶ 8.03 Paved Aprons
- ▶ 8.15 Bituminous Concrete Lip Cub
- ▶ 9.22 Bituminous Concrete Sidewalk and Driveways
- ▶

Specifications for materials can be found in the following sections of Form 818:

- ▶ M.01 Gradation of Aggregate
- ▶ M.02 Granular Fill, Subbase, Granular Base and Surfaces Stone Base, etc.
- ▶ M.04 Bituminous Concrete Materials
- ▶ M.05 Processed Aggregate Base and Pavement Surface Treatment
- ▶ M.12 Rip Rap, etc

These lists are not all-inclusive. Other Sections of Form 818 may be necessary to fully describe the materials and methods for the Work.

NOTICE TO CONTRACTOR – REFERENCED SPECIFICATIONS

Overhead and/or underground utility lines may be in conflict with the required temporary or permanent construction or the equipment necessary to perform this required construction. The actual relocations (permanent or temporary) are the responsibility of the individual utility owners. However, the Contractor is required to coordinate the exact location and timing of all utility relocations with the individual utility owners, and to phase his construction operations as shown on the plans or as required to accommodate all (temporary or permanent) utility relocations. In addition to field meetings and correspondence, this coordination may include staking locations, excavation and temporary grading, providing access to existing and future utility pole and conduit locations, or other physical work as required to allow for utility relocation work.

The Contractor shall engage in the necessary coordination of utility relocations and associated work at no additional cost to the project or owner, and shall have no right to additional compensation for delays or staging and phasing of his work because of utility relocation work.

The Contractor's schedule of operations and construction phasing plans, if different from the sequence of construction, shall show the anticipated utility relocations in the sequence of construction.

The Contractor must coordinate with each utility owner and develop their own schedule of utility relocation work and time required to complete this work based upon their own operational plan and equipment.

The following utility companies have facilities within the project limits:

1. Electric - Eversource
2. Cable – Comcast of Connecticut, Inc. dba Comcast/Hartford
3. Telephone – Frontier Communications
4. Communication – Fiber Technologies Networks, LLC
5. Communication – Level 3 Communications
6. Communications – WilTel Communications, LLC
7. Natural Gas - Connecticut Natural Gas Corp. (CNG)
8. Water & Sanitary Sewer - Metropolitan District Commission (MDC)

NOTICE TO CONTRACTOR – OFF-SITE CONSTRUCTION STAGING AREAS

For all off-site construction staging areas, the Contractor shall prepare a *General Location Plan* in accordance with Section 8.6 of the *East Hartford Zoning Regulations*. The *General Location Plan* must be submitted for approval to the Site Plan Review Committee, which meets weekly. Note that the Committee can refer the submission to the Planning and Zoning Commission under certain circumstances (see Section 8.6.9 of the *Zoning Regulations*). Note that the Planning and Zoning Commission meets monthly.

NOTICE TO CONTRACTOR – GREAT RIVER PARK SPECIAL EVENTS

For this project in Great River Park, it is imperative that the Contractor secure the work area prior to any scheduled day or evening events. The Contractor shall also provide for safe vehicular and pedestrian travel through or around the work zone during normal daily park usage and special events. A schedule of upcoming park events is available online at the link below, however other events may be possible and the Contractor is advised to check with Riverfront Recapture, Inc. for additional restrictions.

<https://riverfront.org/>

TECHNICAL SPECIFICATIONS

GREAT RIVER PARK IMPROVEMENTS

October 1, 2025

TECHNICAL SPECIFICATIONS

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SECTION 01 11 00
SUMMARY OF THE WORK

PART 1 GENERAL

1.1 GENERAL

- A. The work to be done under this Contract and in accordance with these Contract Documents consists of performing all work, supplying all labor, and furnishing and installing all materials and incidentals necessary or convenient for completion of the construction of the site and carrying out all duties and obligations imposed upon the CONTRACTOR by the Contract Documents.
- B. Below is a summary of the work to be performed under this contract. This is only a general summary. See specific descriptions and details on the plans and related specifications sections included in this contract.
- C. Permits for this project contain time of year work restrictions to protect certain fish species which the contractor will be required to adhere to. In particular, this time of year restrictions will restrict in-water pile installation or pile removal. Also, all piles must be installed using vibratory methods and soft-start procedures. Consistent with current Federal guidelines, the soft-start procedure will consist of a series of three (3) reduced energy start sequences followed by full energy installation. See Attachment A Owner Obtained Permits for time of year and other restrictions that the CONTRACTOR must abide by.

1.2 BASE BID AND BID ALTERNATES

- A. Bidding for this project has been structured such that there will be Base Bid and 3 Bid Alternates, which may be awarded at the Owner's sole discretion. It is envisioned that the Base Bid will be awarded provided that funding is sufficient, and that Bid Alternates 1,2, and 3 will be awarded if additional funding is available. Alternates 1,2, and 3 may be awarded individually, in any combination, or not at all. Bid Alternates will only be awarded as a supplement to the Base Bid
- B. **BASE BID:** Work included under the Base Bid will consist of the following general work items. Please note that this is a summary only and that the full description is included on the Bid Schedule, plans, and technical specifications.
 - 1. Removal of 2 existing timber piers and concrete-surface overlooks. The removal of the overlooks will include the removal of existing timber piles from above the mudline and the regrading of the surface. Upon completion of the overlook demolition and pier installation work, the upland work area will be seeded to prevent erosion.
 - 2. Installation of a new 106-foot long by 10-foot wide, L-shaped, concrete-decked fishing pier supported by 16-inch diameter, concrete-filled, steel pipe piles.
 - 3. Addition of a float section to the boat ramp access float to extend the float landward and permit the entry to the gangway to maintain ADA-compliant accessibility.

4. Addition of a timber float section to the waterward end of the boat ramp access float along with a new mooring pile.
5. Reconstruction of an existing 15-inch diameter, reinforced concrete pipe, storm drain outfall.
6. Demolition of existing walkways and other site features and construction of new bituminous walkways.
7. Installation of new decorative light poles and associated underground conduits and electrical feeds.
8. Work shall be conducted from the land surface using conventional cranes, excavation, and hauling equipment. Barge-mounted equipment may only be used for the installation of portions of the fishing pier if allowed by the project permits. To the extent practical, work to be conducted below the elevation of mean high water will be conducted during periods of low tide.

C. BID ALTERNATE 1:

1. Landscape improvements at Bulkeley Bridge Overlook
2. New trees and plantings, improvements to hand rails, vegetation removal, rip rap placement, new park amenities, etc.

D. BID ALTERNATE 2:

1. Concrete Crack, Spall Repairs, and Expansion Joint repairs to stair and retaining wall structure adjacent to the Founders Bridge.
2. Repair and painting of steel handrails

E. BID ALTERNATE 3

1. Park Signage and Displays.
2. Pedestrian Wayside and Overlook Displays

1.3 PAYMENT FOR BASE BID AND BID ALTERNATE ITEMS

A. Payment for both Unit Price Work and Lump Sum Work includes all costs required to complete the work as shown on the plans and as described in the specifications. The Pay Items contained herein are general headings that are to include all related incidental elements. There is no payment for specific work elements shown on the plans or specifications that do not have specific Pay Items, and the OWNER will not accept claims for extra payment on the basis that there is not a designated Pay Item for that particular work element. The contractor shall structure his pricing so that it includes all incidental elements related to the most relevant Pay Item included herein.

1.4 LOCATION OF SITE

A. Work site is located in Great River Park along the eastern bank of the Connecticut River in East Hartford, CT.

1.5 APPLICABLE CODES, STANDARDS, AND PERMITS

- A. Comply with codes and standards applicable to each type of work, and as listed in individual sections.
- B. Special permit restrictions and regulations apply to work within the project limits. See Section 01 14 00 SPECIAL PERMIT RESTRICTIONS AND UTILITY AUTHORIZATIONS; and section 01 57 19 PROJECT PERMITS AND ENVIRONMENTAL CONTROLS
- C. The Contractor shall be bound by all conditions of the permits contained in ATTACHMENT A- OWNER OBTAINED PERMITS. All such permit conditions are hereby incorporated into this contract.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for the work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

END OF SECTION

**SECTION 01 14 00
SPECIAL PERMIT RESTRICTIONS AND UTILITY AUTHORIZATIONS**

PART 1 GENERAL

The CONTRACTOR is required to comply with the terms imposed by the project permits and approvals and with conditions of any utilities who own and/or operate in certain locations where the work will occur. The CONTRACTOR must provide any written work plans, health and safety plans, insurance, permits, and other documents as needed to obtain any additional approvals required to perform the work.

1.1 GENERAL

- A. The Great River Park Project will be performed on lands owned by the Town of East Hartford, or on lands over which the Town has legal rights to own, operate, and repair its flood control infrastructure. The Contractor will be required to coordinate with the Town and several outside utilities that have regulatory, ownership or easement rights, or other control over various locations within the project.

The following is a summary of the regulatory agencies that have issued permits or regulatory authorizations for the project. These permits and authorizations are included in ATTACHMENT A - OWNER OBTAINED PERMITS. The Contractor will be required to fully comply with all terms as described in the permits listed below:

- 1. Town of East Hartford
 - a. Inland Wetlands Permit
- 2. U.S. Army Corps of Engineers
 - a. Section 404 Permit.
 - b. Section 408 Permit.
- 3. CT Department of Energy and Environmental Protection
 - a. Structures Dredge and Fill and Section 401 WQC Permit.
 - b. Natural Diversity Database (NDDDB) Determination – Time of Year restrictions will apply due to threatened and endangered species.

1.2 CONTRACTOR COORDINATION W/ UTILITY AND LAND/EASEMENT OWNERS

- A. Work under this project will involve significant work in proximity to existing underground utilities. Project features will be installed adjacent to existing utilities and in some cases, crossing both over and under existing utilities. The Contractor will be required to perform all coordination and permitting with these utility owners. Utility locations shown on the plans are approximate and are based on records that are available.
- B. The following are known or potential utility owners who own facilities within the project limits, or who may have utility/easement rights and/or ownership rights over portions of the project, along with the types of issues that may be relevant to the work:
 - 1. The Metropolitan District Commission
 - a. MDC Sewer Outfall to CT River

2. Buckeye Partners (Buckeye Pipeline)
 - a. Utility crossing coordination and protection of utilities.
- C. Limited portions of the work may involve access to and work within CT DOT owned rights of way. The CONTRACTOR is responsible to obtain any approvals needed including Encroachment Permits, and provide insurance, signage or other safety devices as required by CT DOT. All costs associated with working in the DOT right of way will be considered part of the unit prices for the related work. There will be no reimbursement for any DOT related costs.
- D. The information in this specification is an outline of the generally required steps, however, the Contractor is responsible to investigate the specific and most current requirements of each entity and to fully comply with the requirements of each. This includes scheduling, work sequencing, safety training, work plans and procedures, hours of work, and compliance with the most current construction standards. All such costs will be at the contractor's sole expense.
- E. The CONTRACTOR shall prepare project specific work plans that provide details of work operations and the means that will be employed to minimize impact on the flood control system, and property and facilities owned by the entities utilities and noted above. Work plans shall include staging, parking, and access details.
- F. Contractor shall comply with other technical requirements included in the various sections of the technical specifications.

1.3 FLOOD CONTINGENCY PLAN

- A. The CONTRACTOR is required to develop a Flood Contingency Plan (FCP) that addresses all aspects of the contract work that could be affected by potential flooding conditions. If requested, The CONTRACTOR will be provided a sample version of the FCP in MS Word format for use in developing a complete FCP as a contract submittal.
- B. The CONTRACTOR shall submit the completed FCP to the OWNER for review and approval prior to the start of any work at the site. CONTRACTOR is notified that the FCP may also be subject to review and approval by the U.S Army Corps of Engineers (USACE) which may add time to the review process.
- C. General Contents of FCP
 1. This plan shall include all provisions needed to allow for the Town of East Hartford's effective operation of the flood control system during times of flooding or predicted flooding. This includes removal of CONTRACTOR equipment and materials from areas subject to flooding; cessation of work activities; alterations to the schedule, including stopping work and demobilizing; and avoidance of work during periods of time when the risk of flooding is identified.
 2. This plan must be in effect prior to, and during the entire time that the CONTRACTOR is mobilized on any part of the flood control system.
 3. Protection must be maintained to accommodate the full capacity of the flood protection system, up to and including the full design flood elevation of 42.0 (1929 NGVD datum). The FCP must contain criteria that will be triggered when designated flood stage levels are predicted and must contain provisions that preclude any impairment of the levee's full protection capability.

4. List key personnel with contact information and flow chart for notifications.
5. List of materials and equipment needed to construct and maintain the temporary system.
6. The FCP must take into consideration the need of East Hartford Flood Crews to perform special operations and maintenance during times of flooding, including flood fighting actions.

1.4 HEALTH AND SAFETY PLAN

- A. The CONTRACTOR is required to develop a Health & Safety Plan (HASP) that addresses all aspects of the contract work. The HASP is subject to approval by the OWNER which must be prior to the start of any work at the site. This plan shall include provisions that address the specific requirements of the the Town of East Hartford, MDC, Buckeye Pipeline, and CT DOT.

1.5 MUSSELL RELOCATION

- A. The Contractor will perform mussel relocation per an approved Mussel Management Plan to mitigate the potential impacts of in-water work on State-listed rare mussel species at the project site. The management plan protocol includes the collection of all State-listed species located within the footprint of the in-water work activity, within 25 feet upstream and downstream of the footprint, and within 10 feet outshore of the footprint, followed by the relocation of collected individuals to a suitable site located approximately 500 feet upstream of all proposed in-water work activities.

1.6 RELATED DOCUMENTS:

- A. Summary of the Work: Section 01 11 00, and all other sections of these contract specifications

1.7 SUBMITTALS:

The CONTRACTOR shall include complete documentation of the compliance with the above including, but not limited to:

- A. Submittal Requirements
 1. Required submittals are described in the respective technical specification sections.
 2. Approval of relevant submittals will be required prior to work commencing.
 3. All submittals are subject to review and approval by the Engineer, Riverfront Recapture, and U.S. Army Corps of Engineers. Contractor must allocate sufficient time for submittal preparation and review by these entities.
 4. Various submittals may require preparation and certification by a licensed professionals as indicated in the technical specifications.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

PART 4 MEASUREMENT AND PAYMENT

A. METHOD OF MEASUREMENT AND PAYMENT

Payment will be made on a lump sum basis upon completion of all items listed in this Specification 01 14 00.

B. PAYMENT ITEMS

ITEM	DESCRIPTION	UNIT
011400	SPECIAL PERMIT REQUIREMENTS	LUMP SUM

END OF SECTION

SECTION 01 33 00
SUBMITTALS

PART 1 GENERAL

- 1.1. SHOP DRAWINGS, MANUFACTURERS' SPECIFICATIONS AND INSTALLATION INSTRUCTIONS, SAMPLES, ETC.
- A. The Contractor shall review and approve all submittals prior to submittal to the Engineer. Each submittal shall be numbered serially and marked with the approval of the Contractor.
1. All submittals shall be prepared in electronic (PDF) format unless otherwise requested by the OWNER or ENGINEER.
 2. The Contractor shall submit to the Owner for approval an electronic copy of all Shop Drawings as called for under the various headings of these specifications for review and approval.
 3. The Contractor shall submit all Shop Drawings to the Owner in sufficient time for checking and processing. Shop Drawings shall be of sufficient clarity so that copies thereof will be legible.
 4. All Shop Drawings submitted by subcontractors for approval shall be sent directly to the Contractor for his approval. The Contractor shall be responsible for their submission to the Engineer at the proper time so as to prevent delays in delivery of materials.
 5. All details on Shop Drawings submitted for approval shall show clearly the relation of the various parts of the work, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and shall be noted on the Shop Drawings before being submitted for approval.
 6. All submissions shall be referenced properly to indicate clearly the location, service and function of each particular item and the specification paragraph under which it is being furnished.
 7. Submittals that are related to or affect each other shall be forwarded simultaneously as a package to facilitate coordinated review. Uncoordinated submittals will be rejected.
 8. The Owner reserves the right to require submittals in addition to those called for in individual sections.
 9. The term "Shop Drawings" includes drawings, diagrams, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by Contractor to explain in detail specific portions of the work required by the Contract.
 10. The Contractor shall notate each submission stating that he has examined and checked the submission as above, and shall date and sign each. Any submission, which, upon examination by the Owner, shows evidence of not having been

thoroughly checked will be returned to the Contractor for completion of checking before it will be considered for review.

11. Each submittal shall be numbered with the project name (abbreviated), specification section and submittal number in consecutive order (Ex NAME-313700-#). Where resubmission is required a letter shall be assigned to designate each resubmission (Ex NAME-313700-#A, NAME-313700-#B, etc.)
 - B. Approval by the Owner shall not relieve Contractor from responsibility for any errors or omissions in such drawings nor from responsibility for complying with requirements of this Contract with approved variations.
 - C. If shop drawings show variations from Contract requirements, Contractor shall identify and describe such variations in writing, separate from the drawings, at time of submission. All such variations must be approved by the Owner.
 - D. The Contractor shall distribute approved submittals to job site and record documents files and to suppliers and subcontractors as required.
 - E. Samples required by the specifications shall be submitted after the award of the Contract to the Owner. No material for which samples are required shall be fabricated or delivered to the site for use until representative samples of same have been approved in writing by the Owner. Such samples shall be furnished and delivered by the Contractor without charge.
 - F. Each sample shall be labeled to designate the material or product, the name of its producer, the name of the Contractor, and the name and number of the project; and each submission shall be accompanied by a certificate describing each sample submitted for approval, certifying that the material, equipment or accessory submitted complies with Contract requirements, and including the name and brand of product, the name and address of manufacturer, the name of the Contractor and the name of the project.
 - G. Approved samples, unless incorporated in the work or otherwise specified, shall be kept on file (and accessible for inspection by the Owner until final acceptance of the project. If return on the samples is not requested within thirty (30) days after the acceptance of the project, they will be considered unclaimed material and disposed of by the Owner.
 - H. Such samples as may be required for check tests shall be furnished by the Contractor without extra charge. Check tests will be made on materials delivered for use only as frequently as the Owner considers necessary to ensure compliance of materials used with Contract requirements. The cost of testing materials, or equipment, or accessories to check for compliance with specification requirements shall be borne by the Contractor.

1.2. PROJECT RECORD DOCUMENTS

- A. CONTRACTOR shall keep on file at job site one complete set of up-to-date Contract Documents, including drawings and specifications, addenda, shop drawings and manufacturer's data, testing data, change orders, field orders and other modifications. Documents shall be neatly and securely stored in files, clearly indexed by trade activity or specification section, and shall not be used for construction purposes.
- B. CONTRACTOR shall legibly mark significant field changes such as the following:
 - 1. Drawings: locations of concealed utilities, field changes of dimension and detail, changes resulting from change order or field order, and details not on original drawings.
 - 2. Specifications: manufacturer and model number of equipment actually installed.
 - 3. Shop Drawings and manufacturers' literature: changes made after the Owner's review.
- C. At completion of work, deliver completed as-built record documents to the Owner. Final payment for project will not be made until the Owner reviews and approves these documents.

PART 2 PRODUCTS
(Not Applicable).

PART 3 EXECUTION
(Not Applicable).

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for the work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

*** END OF SECTION ***

**SECTION 01 35 30
HEALTH AND SAFETY**

PART 1 GENERAL

1.1 WORK INCLUDES

- A. Establishment and implementation of protocols and procedures to protect worker health and safety as it relates to activities performed in association with the project.
- B. The Health and Safety Plan (HASP) shall comply with all federal, state, and local worker health and safety laws, regulations, ordinances, practices, and protocols (the “Safety Requirements”).

1.2 GENERAL SAFETY PROVISIONS

- A. The CONTRACTOR shall be solely and completely responsible for conditions of the jobsite, including safety of all persons (including employees) and property during the performance of the Work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to all applicable federal and local laws, ordinances, codes, and regulations. Where any of these are in conflict, the more stringent shall be followed. The CONTRACTOR's failure to thoroughly familiarize themselves with the aforementioned safety provisions shall not relieve them self from compliance with the obligations and penalties set forth therein.
- B. The CONTRACTOR shall develop and maintain for the duration of this Contract, a safety program that will effectively incorporate and implement all required safety provisions. The CONTRACTOR shall appoint an employee who is qualified and authorized to supervise and enforce compliance with the safety program.
- C. The duty of the OWNNER or ENGINEER does not include review or approval of the adequacy of the CONTRACTOR’S safety program, safety supervisor, or any safety measures taken in, on, or near the project site.
- D. The CONTRACTOR, as part of his safety program, shall maintain at his office or other well-known place at the Project site, safety equipment and instruments applicable to the work as prescribed by the aforementioned authorities, all articles necessary for giving first aid to the injured, and shall establish the procedure for the immediate removal to a hospital or a doctor's care of persons (including employees) who may be injured on the Project site.
- E. If death, or serious injuries, or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the ENGINEER and the OWNER. In addition, the CONTRACTOR shall promptly report in writing to the OWNER all accidents arising out of, or in connection with, the performance of the Work whether on, or adjacent to, the Project site, giving full details and statements of witnesses.
- F. If a claim is made by anyone against the CONTRACTOR or any subcontractor on account of any accident, the CONTRACTOR shall promptly report the facts in writing to the ENGINEER and the OWNER, giving full details of such claim.

1.3 SUBMITTALS

- A. At least three weeks prior to the start of construction activities, submit a Site Specific Health and Safety Plan (HASP) to the ENGINEER for review. The HASP shall specify the Health and Safety Officer (HSO). The HASP shall conform to all Safety Requirements, including, without limitation, those contained in the pertinent sections of 29 CFR 1926 and 29 CFR 1910.

1.4 RELATED SECTIONS

- A. Section 3.1: SITE SPECIFIC HEALTH AND SAFETY PLAN

PART 2 PRODUCTS

2.1 PERSONAL PROTECTIVE EQUIPMENT

- A. Provide personal protective equipment (PPE) as stipulated in the CONTRACTOR's HASP during the performance of work.

2.2 SAFETY EQUIPMENT AND MONITORING INSTRUMENTS

- A. The CONTRACTOR shall provide and maintain all safety equipment and portable monitoring instruments required to safely perform the work and comply with State and Federal Regulations.

PART 3 EXECUTION

3.1 SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP)

- A. Develop and maintain for the duration of this Contract, a written Site Specific Health and Safety Plan (HASP) which complies with all safety requirements and addresses those issues directly related to site conditions.
- B. No physical aspects of the Work shall begin until a HASP is submitted to the ENGINEER. However, the time to perform under the contract will begin on the date stipulated in the Notice to Proceed.
- C. Preparation of the Site Specific HASP is solely the CONTRACTOR's responsibility and no statement made in these provisions shall relieve CONTRACTOR of sole responsibility for information included and implementation of the Site Specific HASP.
- D. Submission of the Site Specific HASP is solely for evidence of compliance with the Contract Documents, and for reference and general information. Submission and subsequent review by ENGINEER or OWNER shall not relieve CONTRACTOR from sole responsibility as to the adequacy of its Site Specific HASP.
- E. The ENGINEER's or OWNER's review of the CONTRACTOR's performance is not intended to include a review or approval of the adequacy of the CONTRACTOR's safety supervisor, safety program or any safety measures taken in, on, or near the Site.
- F. The HASP shall be developed by a qualified person working for and designated by the CONTRACTOR as the Hazardous Safety Manager (HSM). The HSM shall have review and acceptance authority over the HASP.

- G. The HASP, maintained on Site by the CONTRACTOR, shall be kept current with remediation/construction activities and actual site conditions. The following items, at a minimum, shall be addressed in the HASP:
1. Site description and project evaluation.
 2. Names of key personnel, and any alternates, responsible for site safety and health (including responsibilities, chain of command, and contact information).
 3. Safety and health hazard assessment for each site task and operator.
 4. Procedures for emergency medical treatment and first aid.
 5. Map indicating route to hospital for emergency medical care.
 6. Plan to carry out inspections, and pre-job, toolbox safety committee, incident review, and other meetings,
 7. Equipment decontamination procedures, if applicable,
 8. Air monitoring procedures and action levels, if applicable,
 9. Personal protective equipment, decontamination procedures and disposal procedures, if applicable
 10. Physical hazard evaluation including:
 - a. Equipment operation.
 - b. Confined space entry.
 - c. Slips and falls.
 - d. Falling debris.
 - e. Encountering unmarked utilities.
 - f. Cold and heat stress.
 - g. Hot work (cutting and welding).
 - h. Excavation entry.
 11. Training requirements.
 12. Medical surveillance.
 13. Recordkeeping requirements.
 14. Emergency response plan that includes:
 - a. Evacuation routes and procedures.
 - b. Emergency alerting and response procedures.
 - c. Emergency response plan to comply with 29 CFR 1910.120(l).
 15. Communication protocols for reporting to the OWNER and ENGINEER site safety issues or concerns, first aid incidents, emergencies, damage claims, and the like.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for the work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

END OF SECTION

SECTION 01 45 00
QUALITY CONTROL AND QUALITY ASSURANCE

PART 1 GENERAL

1.1 WORK INCLUDES

- A. CONTRACTOR Quality Control.
- B. OWNER/ENGINEER Quality Assurance.

1.2 DEFINITIONS

- A. Quality Control: Evaluations, observations, tests, and measurements performed by CONTRACTOR to control the quality of his work or to verify that the work is performed in accordance with the requirements of the contract documents.
- B. Quality Assurance: Independent evaluations, observations, tests, and measurements performed by OWNER or ENGINEER to verify the accuracy of CONTRACTOR's quality control data.

1.3 CONTRACTOR QUALITY CONTROL

A. General

- 1. Perform Quality Control activities as the minimum at the frequencies specified in the individual specification sections and as necessary to control the quality of the work within specified requirements.
- 2. Testing for quality control purposes shall be made by an independent testing laboratory or agency licensed or certified in accordance with Laws and Regulations and applicable state and local statutes. In the event state license or certification is not required, testing laboratories or agencies shall meet following applicable requirements.
 - a. "Recommended Requirements for Independent Laboratory Qualification," published by the American Council of Independent Laboratories.
 - b. Basic requirements of ASTM E 329, "Standard of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction.
 - c. Calibrate testing equipment at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards or accepted values of natural physical constants.

B. CONTRACTOR's Quality Control Responsibilities include:

- 1. Material property tests for all earthwork items imported from off-site sources.
- 2. Tests on items manufactured or fabricated off-site.
- 3. Field and laboratory quality control tests to control CONTRACTOR's fill and backfill placement operations.

C. Results of all Quality Control activities shall be made available to OWNER and ENGINEER at CONTRACTOR's site office by the end of the next working day.

1.4 OWNER AND ENGINEER QUALITY ASSURANCE

A. General

1. OWNER will arrange for and pay all costs in connection with Quality Assurance activities.
2. Quality Assurance activities performed by OWNER or ENGINEER will not in any way relieve CONTRACTOR of performing Quality Control activities required by the contract documents.
3. Quality Assurance activities will be performed at frequencies as determined appropriate by OWNER or ENGINEER.

B. Quality Assurance Testing may include:

1. Additional tests of earthwork materials from off-site sources.
2. Tests and observations of excavations and bearing surfaces for structures.
3. Field testing, laboratory testing, and visual observation of earthwork materials.

C. If requested, CONTRACTOR shall provide representative samples from off-site stockpiles or storage bin(s) for quality assurance testing. OWNER and ENGINEER reserves the right to sample materials at the source of production.

D. Acceptance of the Work will be based on ENGINEER's review of CONTRACTOR's quality control data and OWNER's and ENGINEER's quality assurance data, as well as on visual observation made by ENGINEER of CONTRACTOR's work, including any rework effort required to complete the project in compliance with these Contract Documents.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for the work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES, CONTROLS, AND MOB & DEMOBILIZATION

PART 1 GENERAL

1.1 GENERAL

A. Construction facilities and temporary controls include those items necessary for performance of the Work that are not part of the permanent construction. Work described in this section, and not covered under other contract pay items, will be paid under the Mobilization and Demobilization items as detailed in this specification. Work shall be to provide the temporary facilities and site controls throughout the construction phase and as required to perform the work specified within the contract documents including but not limited to:

1. Site Security
2. Material Storage
3. Site Safety
4. Conformance with regulatory approvals and conditions
5. Temporary signage as required

1.2 SUBMITTALS

A. Shop Drawings. Submit at least 21 days prior to start of work which will allow 14 days for the ENGINEER/OWNER's subsequent review. The following shop drawings are required:

1. Project Identification Sign
2. Plan for site access. The plan shall include permits and approvals for secondary site access roads.
3. Plan for on-site security and fencing.
4. Plan for staging and stockpile areas.
5. Plan for obtaining water and delivering water to the necessary construction areas.
6. Plan for sedimentation and erosion control.
7. Implementation or control plans for meeting the requirements of OWNER-obtained permits as described in Section 01 57 19: PROJECT PERMITS AND ENVIRONMENTAL CONTROLS.
8. Plan for temporary utilities
9. Plan for temporary construction facilities
 - a. CONTRACTOR field office location and layout.
 - b. Temporary access roads, ramps and haul roads; including routes, cross sections, and drainage provisions.
 - c. Staging areas; including parking areas and storage yard layout.
 - d. Temporary fences, gates, and barriers.
 - e. Pedestrian detour routes, sequencing and signage.

B. Administrative:

1. Copies of permits obtained by CONTRACTOR.

1.3 MOBILIZATION

- A. The Mobilization Pay Item has been included for the purposes of providing for payment of expenses incidental to the initiation of construction and various operations as described in Part 3 of this specification.
- B. The Pay Item for Mobilization is intended to compensate the CONTRACTOR for operations including, but not limited to: Submittal of all required documents.; submittal of copies of all CONTRACTOR-required permits and approvals; preparation of Quality Control Plan, Health and Safety Plan, and all other preconstruction submittals; mobilization of personnel, equipment, and materials; preparation of surveys and videos for existing access roads and facilities; installation and maintenance of all temporary facilities; temporary utility connections, parking, sanitary facilities and establishment of staging/lay down areas, equipment servicing and maintenance facilities, access roads, safety items, etc.
- C. All facilities, plants, and equipment that are established at, or brought to, the work site shall be deemed to be subject to the provisions of this paragraph unless OWNER specifically provides otherwise in writing for a particular item or items. CONTRACTOR shall be solely responsible for the adequacy, efficiency, use, protection, maintenance, repair, and preservation of all facilities, plants, and equipment. No facilities, plants, or equipment shall be dismantled or removed from the work site prior to completion of the Work under the contract without the written permission of OWNER.
- D. Payment under the Mobilization item is intended to cover all such costs not covered under the other unit price and lump sum items in the contract.

1.4 DEMOBILIZATION

- A. The Demobilization Pay Item has been included for the purposes of providing for payment of demobilization tasks, including but not be limited to, providing all labor, materials, and equipment required to restore any areas disturbed during the project to a condition substantially the same as the pre-construction condition.
- B. The Pay Item for Demobilization is intended to compensate the CONTRACTOR for operations including, but not limited to: removal of staging and lay down areas; re-establishment of all disturbed vegetation; repair of pavement, sidewalks, curbs disturbed by construction; removal of all trash and debris; transportation, removal and disposal of all erosion and sediment controls and accumulated settlement; and restoring all areas to the satisfaction of the Engineer.
- C. Work also includes submission of as-built drawings and coordination with the Engineer for preparation of Record Drawings; and submission of all records, warranties, and other documentation required to close out the project permits and the construction contract.
- D. Payment under the Demobilization item is intended to cover all such costs not covered under the other unit price and lump sum items in the contract.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 TEMPORARY UTILITIES

A. Power

1. CONTRACTOR shall make arrangements and pay all costs for electrical service as required.

B. Water

1. The CONTRACTOR shall make arrangements and pay all costs for all water for use in construction activities
2. CONTRACTOR shall provide means to transport and store water to areas used for fill processing, dust control, or other construction activities.
3. CONTRACTOR shall provide and maintain adequate supplies of drinking water for personnel.

C. Sanitary Facilities

1. Provide and maintain suitable, weather-tight, painted, sanitary toilet facilities for all work persons during the construction period.
2. Existing facility use is not permitted. Provide facilities at time of project mobilization.
3. When toilet facilities are no longer required, promptly remove from site. Disinfect and clean or treat the area as required.
4. Keep all toilet facilities clean and supplied with toilet paper at all times.

D. Lighting

1. Provide temporary lighting to meet applicable safety requirements to allow erection, application, or installation of materials, and observation and inspection of the Work.

- E. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas to same or better condition as original.

3.2 CONSTRUCTION ACCESS AND HAUL ROADS

- A. CONTRACTOR shall investigate the adequacy of existing roads and the allowable load limit on these roads. The CONTRACTOR shall, at its own expense, protect existing access roads and utilities as necessary for proper prosecution of the work under this contract.

- B. The CONTRACTOR shall provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic.

- C. The method of dust control shall be adequate to ensure safe operation at all times.

- D. Existing access roads shall be maintained at pre-construction condition or better throughout the contract period, including any portions of existing levees or levee ramps used for access. The CONTRACTOR shall be responsible for the repair of any damage to roads caused by construction operations.

- E. The CONTRACTOR shall survey and make photographic or video record of the portions of existing roads, levees, and levee ramps that will be used by the CONTRACTOR as access.

- F. Provide unimpeded access for emergency vehicles.

G. Provide and maintain access to fire hydrants and control valves free of obstructions.

3.3 PROTECTION OF EXISTING ROADS

- A. Obtain all permits required by the ConnDOT and Town of East Hartford during construction. Repair damage to public roads caused by CONTRACTOR operations.
- B. Prior to using public and project access roads, perform a condition survey of these roads, including the existing culverts and head walls under these roads. The condition survey shall be performed by competent personnel that are qualified and experienced in this work. Sufficient notes, measurements, photographs, videotapes, or other documentation of the existing condition of the roads shall be performed. Survey of public roads shall extend 300 feet in each direction from the intersection with the project access road.
- C. To minimize tracking of mud or debris onto public roads construct anti-tracking pads at site access points for all construction traffic.

3.4 PARKING AREAS

- A. Arrange for temporary parking areas to accommodate construction personnel.
- B. Parking for the employees of CONTRACTOR and for OWNER personnel will be allowed in the staging and stockpile areas.
- C. Use of existing parking facilities by construction personnel is not permitted, except as designated by the OWNER.
- D. Do not allow heavy vehicles or construction equipment in parking areas.
- E. Maintenance:
 - 1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
 - 2. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.
- F. Removal, Repair:
 - 1. Remove temporary materials and construction equipment when permanent paving is usable.
 - 2. Repair existing facilities damaged by use, to original condition.

3.5 STAGING AREAS

- A. Stockpile equipment, supplies, imported earthfill materials, and other materials incidental to the construction in the approved staging or stockpile areas.

3.6 WEATHER PROTECTION

- A. Provide protection against weather to maintain all materials, apparatus, fixtures, and work free from damage whether in shipment, in storage, or in place.

- B. When heat is required for proper weather protection, provide temporary enclosures of work and acceptable means to provide sufficient heat to maintain a temperature of not less than 50°F. Provide higher temperatures when required by these Specifications.

3.7 FIRE PREVENTION FACILITIES

- A. Portable Fire Extinguishers: NFPA 10; 10 pound capacity, 4A-60B: C UL rating. Provide minimum one fire extinguisher in every construction office, storage shed, and construction vehicle.

3.8 EXISTING FENCES AND GATES

- A. Do not remove existing fences or gates without authorization from OWNER. Where approved, and CONTRACTOR removes existing fences to facilitate the Work, temporary fence protection for lands adjacent to the right-of-way shall be provided at all times during the continuation of the Contract. CONTRACTOR shall rebuild fence in as good condition as found as part of the cleanup operations prior to final acceptance of the completed Work.

3.9 SITE SECURITY

- A. Provide adequate security for protection of OWNER's and CONTRACTOR's property, equipment, and facilities.
- B. All existing and temporary gates and fences shall be secured and locked during non-working hours. Provide padlocks at all gates. All gates shall be double padlocked to allow OWNER, CONSTRUCTION MANAGER, and ENGINEER access to the site without disturbing CONTRACTOR's locks.

3.10 OPERATIONS AND STORAGE AREAS

- A. Do not enter on or occupy with personnel, tools, equipment, or material any ground outside OWNER's property without the written consent of the owner of such ground.
- B. Other contractors and employees or agents of OWNER may for all necessary purposes enter upon the Work and premises used by CONTRACTOR. Conduct work so as not to impede unnecessarily any work being done by others on or adjacent to the site.

3.11 TEMPORARY FENCING AND BARRICADES

- A. Provide secure temporary closures to prevent unauthorized entry only to the specific locations shown on the project plans where work will be conducted. Site security measures shall not restrict public access to the portions of the park which are not part of the actual work zones or staging areas. Site security fencing shall include the following:
 - B. Temporary chain link fence as required to control access to work zones.
 - C. Locked gate(s) at each work zone access point.
 - D. Signage indicating 24 hour emergency contact visible from outside the work area.
- E. CONTRACTOR shall erect and maintain temporary fencing and barricades to limit public access to the work area and to hazardous areas. Temporary fencing and barricades shall be required whenever safe public access to paved areas such as roads, parking areas, or sidewalks is prevented by construction activities or whenever necessary to ensure the safety

of both pedestrian and vehicular traffic. Temporary Fencing and barricades shall be securely placed and shall be clearly visible and adequately illuminated to provide sufficient visual warning of the hazard during both day and night.

3.12 SITE MAINTENANCE

- A. Promptly remove materials or equipment that have served their use on the Site.
- B. At the end of each day, perform the following:
 - 1. Secure the site and work areas.
 - 2. Store equipment and materials in approved locations;
- C. The CONTRACTOR shall maintain all grassed areas between the limits of work area until final acceptance of the project and shall restore or replace any portion of the seeding work that is found defective or which becomes damaged prior to final acceptance.

3.13 CLEANUP AND DISPOSAL OF WASTE MATERIALS

- A. The cleanup and disposal of waste materials and rubbish shall be in accordance with applicable Laws and Regulations. Should a conflict exist in the requirements for cleanup and disposal of waste materials, the most stringent requirement shall apply.
- B. Keep work and storage areas free from accumulations of waste materials and rubbish, and before completing the Work.
- C. Remove all plant and storage facilities, buildings, including concrete footings and slabs, rubbish, unused materials, concrete forms, and other materials that are not a part of the permanent Work.
- D. Upon completion of the Work, and following removal of construction facilities and required cleanup, work areas shall be regraded, reclaimed, and left in a neat manner conforming to the natural appearance of the landscape.
- E. Clean and repair damage caused by installation or use of temporary work.
- F. Waste materials, including but not restricted to, cleared and grubbed vegetation, refuse, garbage, sanitary wastes, chemical additives, industrial wastes, oil, and other petroleum products, shall be disposed of by CONTRACTOR by removal from the construction area. Dispose of material in an appropriate off-site waste disposal facility.
- G. Burning of cleared vegetation and waste materials shall not be permitted.

PART 4 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
015000-1	Mobilization	LS
015000-2	Demobilization	LS

END OF SECTION

SECTION 01 56 39
TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. The Work of this Section Includes: General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

1.2 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by a diameter tape or the average of the smallest and largest diameters at a height 6 inches above the ground for trees up to and including 4-inch size at this height and as measured at a height of 12 inches above the ground for trees larger than 4-inch size.
- B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings defined by a circle concentric with each tree with a radius 12 times the tree's caliper size and with a minimum radius of 96 inches unless otherwise indicated.
- D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.
 2. Detail fabrication and assembly of protection-zone fencing and signage.
 3. Indicate extent of trenching by hand or with air spade within protection zones.
- C. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
1. Species and size of tree.
 2. Location on site plan. Include unique identifier for each.
 3. Reason for pruning.
 4. Description of pruning to be performed.
 5. Description of maintenance following pruning.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For arborist and tree service firm.

- B. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- D. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.5 QUALITY ASSURANCE

- A. Arborist Qualifications: Certified Arborist as certified by ISA and Licensed arborist in jurisdiction where Project is located.
- B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

1.6 FIELD CONDITIONS

- A. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Moving or parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Backfill Soil: Planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

1. Planting Soil: Planting soil Type I or Type II as specified in Section 32 91 15 . Soil Preparation (Performance Specification)."
- B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
 1. Type: Shredded hardwood aged a minimum of 6 months from production.
 2. Size Range: 3 inches maximum, 1/2 inch minimum.
 3. Color: Natural.
- C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:
 1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft.; remaining flexible from minus 60 to plus 200 deg F; inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi; secured with plastic bands or galvanized-steel or stainless steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches apart.
 - a. Height: 48 inches.
 - b. Color: High-visibility orange, nonfading.
- D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering and as follows:
 1. Size and Text: 12 inches by 18 inches minimum. Text: "STAY OUT – TREE PROTECTION AREA".
 2. Lettering: 3-inch- high minimum, white characters on red background.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Tie a 1-inch blue vinyl tape around each tree trunk at 54 inches above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root

systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.3 PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people and animals from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
 - 1. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
- B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 50 feet on protection-zone fencing, but no fewer than four signs with each facing a different direction.
- C. Maintain protection zones free of weeds and trash.
- D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.
 - 1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
 - 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

- A. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.
- B. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.
- C. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

- A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as directed by arborist and as follows:
 - 1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
 - 2. Cut Ends: Do not paint cut root ends.
 - 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 4. Cover exposed roots with burlap and water regularly.
 - 5. Backfill as soon as possible as directed by Engineer.
- B. Root Pruning at Edge of Protection Zone: Prune tree roots flush with the edge of the protection zone by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

- A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.
 - 1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
 - 2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
 - 3. Pruning Standards: Prune trees according to ANSI A300 (Part 1) and as indicated on Drawings.
 - a. Type of Pruning: Cleaning and where indicated.
- B. Unless otherwise directed by arborist and acceptable to Architect, do not cut tree leaders.
- C. Cut branches with sharp pruning instruments; do not break or chop.
- D. Do not paint or apply sealants to wounds.
- E. Provide subsequent maintenance pruning during Contract period as recommended by arborist.
- F. Chip removed branches and dispose of off-site.

3.7 REGRADING

- A. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.

1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

B. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect.

1. Submit details of proposed pruning and repairs.

2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.

3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

1. Small Trees: Provide new trees of same size and species as those being replaced for each tree that measures 6 inches or smaller in caliper size.

2. Large Trees: Provide two new tree(s) of 3-inch caliper size for each tree being replaced that measures more than 6 inches in caliper size.

a. Species: As selected by Architect.

3. Plant and maintain new trees as specified in Section 32 93 00 "Plants."

C. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 2-inch uniform thickness to remain.

D. Soil Aeration: Where directed by Architect, aerate surface soil compacted during construction. Aerate 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

PART 4 - MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

A. Measurement for TEMPORARY TREE AND PLANT PROTECTION shall be made by the Contract Price Lump Sum and shall be measured once only for this Contract.

4.2 METHOD OF PAYMENT

A. Payment for TEMPORARY TREE AND PLANT PROTECTION shall be by the Contract Price Lump Sum for the protection of all trees and plants indicated as such within the Contract Documents or otherwise as directed by the Owner. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, disposal, storage, handling, protection, and supervision for the satisfactory completion of all items under this section.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
01 56 39	TEMPORARY TREE AND PLANT PROTECTION	LS

END OF SECTION

SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 WORK INCLUDES

- A. Provide all layout, products, materials, equipment, tools, services, transportation, supervision, and labor to complete all temporary erosion and sediment control required to complete the work as shown on the drawings and including the following:
 - 1. Install and maintain erosion protection and sediment control.
 - a. Erosion protection and sediment control measures shall comply with the erosion, and sediment controls shown on the Drawings and all requirements for other local, state, and federal permits associated with erosion protection and sediment control. This shall include, but may not be limited to, the permits described in Section 01 57 19: PROJECT PERMITS AND ENVIRONMENTAL CONTROLS, and Attachment A: OWNER OBTAINED PERMITS.

1.2 REFERENCES

- A. 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, State of Connecticut DEP Bulletin 34, or most current revision.

1.3 DEFINITIONS

- A. Sediment and Erosion Control devices as defined herein shall mean silt fences, hay bales, sediment control logs, catch basin inserts, erosion control blankets, anti-tracking pad , or other devices approved by ENGINEER.

1.4 SUBMITTALS

- A. Submit material specifications and shop drawings for all materials furnished under this Section.
- B. Submit PDF versions of all inspection and maintenance report forms.

1.5 PERMIT CONDITIONS

- A. Contractor and Subcontractors are bound to comply with any project-related permits obtained by Owner or Engineer for the work of the project. Such permits will affect performance of the work, and Contractor and Subcontractors are bound to comply with requirements of such permit and representations contained in permit application as though Contractor and Subcontractor were the Permittee/permit-holder. Requirements and conditions set forth in Owner or Engineer-obtained project-related permits and permit applications shall be binding on Contractor just as any Specification would be.

1.6 QUALITY CONTROL

- A. Contractor shall be responsible for the timely installation and maintenance of all sedimentation control devices necessary to prevent the erosion of soil or movement of

sediment from construction activities to off-site areas via surface runoff or underground drainage systems. Measures in addition to those shown on the Drawings necessary to prevent the movement of sediment off site shall be installed, maintained, removed, and cleaned up at the expense of Contractor.

- B. Where additional erosion and sedimentation control measures are required beyond what is indicated on the Drawings or herein, comply with applicable sections of the Connecticut Guidelines for Soil Erosion and Sediment Control, DEEP Bulletin 34, State of Connecticut Council on Soil and Water Conservation, 2002.
- C. If applicable, comply with applicable provisions of the Connecticut Department of Energy and Environmental Protection (DEEP) General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, (DEEP-WPED-GP-015), latest revision thereof. Conditions of such General Permit, other conditions of approval or authorizations, and associated Stormwater Pollution Control Plan (SWPCP) shall become part of the Contract Documents.
- D. Engineer has the authority to order immediate, additional, temporary control measures to prevent contamination of adjacent streams or other watercourses, or other areas of water impoundment and damage by erosion.
- E. If Engineer observes construction procedures and operations that jeopardize erosion control provisions, Engineer will notify Contractor. If such construction procedures and operations are not corrected promptly, Engineer may suspend the performance of any or all construction until corrections have been made, and such suspension shall not be the basis of any claim by Contractor for additional compensation, nor for an extension of time to complete the Work.
- F. Should construction materials be washed away or otherwise rendered ineffective in the opinion of Engineer during the progression of the Work, Contractor shall replace the installations at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 SILT FENCE

- A. Pervious Sheet: Polyester, polypropylene, or nylon filaments, woven into a uniform pattern, distinct and measurable openings.
- B. In accordance with requirements of Table 1:

TABLE 1.

Physical Property	Required value	Test Method
Weight, oz./sq.yd., minimum	4	ASTM D 3776
Equivalent Opening Size, maximum	50 – 70	U.S. Standard Sieve
Grab Tensile Strength, lb., minimum	120	ASTM D 4632
Elongation, % maximum	15	ASTM D 4632
Mullen Burst Strength, psi, minimum	300	ASTM D 3786

Ultraviolet Radiation Resistance, % Strength Retention	70	ASTM D4355
Flow Rate, gal/minute/sq.ft, minimum	10	ASTM D 4491
Ultraviolet Radiation Stability, % minimum	90	ASTM G 26

C. Support Fence:

1. Wire Mesh Material: As and if recommended by manufacturer of geotextile; strong enough to support applied loads.
2. Support Posts: As recommended by manufacturer of geotextile.
3. Fasteners: Heavy-duty wire staples at least 1 inch long, tie wires or hog rings, as recommended by manufacturer of geotextile.

2.2 HAY BALES

- A. Hay bales or wattles used for short-term or long-term erosion control, silt fencing, and as vegetation aid shall be certified weed free.
- B. Hay bales shall be securely set in place by partially burying the bottoms and anchoring with redwood stakes per Urban Drainage Standards.

2.3 SEDIMENT CONTROL LOGS

- A. Straw-filled tube of flexible netting material. Machine-produced tube of compacted straw that is certified weed free. Netting shall consist of seamless, high-density polyethylene and ethyl vinyl acetate and contain ultraviolet inhibitors.
- B. Meet the minimum performance requirements in Table 2.

TABLE 2.

Physical Property	Test Method	Required Value
Mass per Unit Weight, lbs/ft	Field Measured	1.6
Dimension, inch diameter	Field Measured	8.0 – 9.0
Net Strand Thickness, inch	Field Measured	0.030
Netting Unit Weight, ounces/ft.	Certified	0.35
Sediment Retention Capacity, lbs/ft	Rainfall Sim. ⁽¹⁾	30
Installed Free-Board Ht., inches	Field Measured	6.0 – 7.0
Soil Loss ⁽¹⁾ , % effectiveness	Rainfall Sim. ⁽¹⁾	58 ⁽²⁾
De-Stabilizing Moisture, % Retained (max.)	Rainfall Sim. ⁽¹⁾	11

Notes:

1. Minimum of three 10-year predicted storm events on 3H:1V slope with clayey sand type soil.
2. Minimum sediment yield reduction value.

2.4 CATCH BASIN INSERT

- A. Catch basin insert shall be a Siltsack®, or approved equivalent.
- B. Catch basin insert shall be manufactured to fit the opening of the catch basin or drop inlet. Catch basin insert shall have the following features:

1. Dump straps attached at the bottom to facilitate the emptying.
2. Lifting loops as an integral part of the system to be used to lift the insert from the basin.
3. Restraint cord approximately halfway up the sack to keep the sides away from the catch basin walls, this cord is also a visual means of indicating when the sack should be emptied. Once the strap is covered with sediment, the insert should be emptied, cleaned and placed back into the basin.

2.5 EROSION CONTROL BLANKETS

- A. Erosion control blankets shall satisfy the requirements in the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, State of Connecticut DEP Bulletin 34 or most current version. Erosion control blankets shall be:
 1. Composed of fibers and/or filaments that are biodegradable or photodegradable within two years but without substantial degradation over the period of intended usage (five months maximum),
 2. Mechanically, structurally or chemically bound together to form a continuous matrix of even thickness and distribution that resists raindrop splash and when used with seeding allows vegetation to penetrate the blanket,
 3. Of sufficient structural strength to withstand stretching or movement by wind or water when installed in accordance with the manufacturer's recommendations,
 4. Free of any substance toxic to plant growth and unprotected human skin or which interferes with seed germination,
 5. Contain no contaminants that pollute the air or waters of the State when properly applied, and
 6. Provide either 80%-95% soil coverage when used as a substitute for Mulch for Seed or 100% initial soil coverage when used as a substitute for Temporary Soil Protection measure.

2.6 ANTI-TRACKING PAD

- A. Construct anti-tracking gravel pad to dimensions shown on the drawing or as approved by the ENGINEER to control materials being transported onto public roads via vehicles leaving the site. Maintain proper operations of the anti-tracking pad for the duration of the project.

2.7 TURBIDITY CURTAIN (SILT CURTAIN)

- A. All Turbidity Curtain shall be Type 3 Heavy Duty curtain as supplied by ABASCO LLC or approved equal, and must meet regulations and requirements of the Clean Water Act, and National Pollution Discharge Elimination System (NPDES) requirements.
- B. Turbidity Curtain shall be a brightly colored, tightly woven geosynthetic or impervious reinforced thermoplastic material.
- C. Contractor shall provide a detailed submittal for review and approval by the Engineer prior to installation.

- D. Turbidity Curtain shall be properly weighted or anchored to assure either contract or the specified clearance from the river bottom, and be capable of resisting normal currents and water movement.

PART 3 EXECUTION

3.1 SEDIMENT AND EROSION CONTROL

- A. Install erosion controls to the required lines, levels, contours, and datums shown on the Drawings.
- B. Install sediment and erosion controls prior to work involving site clearing, stripping and stockpiling topsoil, excavation, and earthwork.
- C. Maintain and repair sediment and erosion controls during course of construction.

3.2 SILT FENCE

- A. Silt fence shall be one-piece or continuously sewn to make one-piece geotextile for full height of the fence, including portion buried in the toe trench.
- B. When joints are necessary, splice geotextile together only at a support post, with a minimum 6-inch overlap, and securely fasten both ends to support post.
- C. Geotextile shall not extend more than 24 inches above the ground surface. Securely fasten to up slope side of each support post using ties or staples. Bottom portion of geotextile shall be securely backfilled in toe trench such that it is not easily pulled out by hand. Geotextile shall not be stapled to existing trees.
- D. Fasten wire mesh material support fence securely to up slope side of post fasteners. Extend wire into the trench a minimum of 4 inches, and not more than 36 inches above the ground surface.
- E. Take precaution not to puncture geotextile during installation. Repair or replace damaged area.

3.3 SEDIMENT CONTROL LOGS (SCL)

- A. Excavate a small trench, 2 to 3 inches in depth on the slope contour and perpendicular to water flow. Soil from the excavation should be placed down slope next to the trench.
- B. Install the SCL in the trench, ensuring that no gaps exist between the soil and the bottom of the SCL. The ends of adjacent SCLs should be tightly abutted so that no opening exists for water or sediment to pass through.
- C. Wooden stakes should be used to fasten the SCL to the soil. Place stakes at 4 feet on center.
- D. Terminal ends of SCL should be doglegged upslope to ensure containment and prevent channeling of sedimentation.

3.4 CATCH BASIN INSERT

- A. Install catch basin insert in accordance with manufactures instructions.

3.5 EROSION CONTROL BLANKETS

- A. Install at locations where required or as shown on the drawings.
- B. Install as shown on the drawings.
- C. Install following seeding on slopes of at least 3H:1V, as directed by the ENGINEER, and in accordance with manufacturer's recommendations.
- D. Staples shall be installed as per Manufacturer's recommendations.
- E. Where two lengths are joined, the end of the up-grade strip shall overlap the down-grade strip.
- F. The CONTRACTOR shall maintain and protect the areas with erosion control matting until such time as the turf grass is established.

3.6 ANTI-TRACKING PADS

- A. Construct anti-tracking pad as necessary to control sediment leaving the site.

3.7 TURBIDITY CURTAIN (SILT CURTAIN)

- A. Install Turbidity Curtain, also referred to as Silt Curtain, in accordance with project plans and permits.
- B. Turbidity Curtain shall be sufficiently weighted or anchored to assure either contract or the specified clearance from the river bottom, and be capable of resisting normal currents and water movement.
- C. Turbidity Curtain shall be maintained throughout the course of construction and shall be repaired as needed if damaged or deteriorated. The Turbidity Curtains shall be removed along with any accumulated sediment at completion of construction.
- D. Contractor shall provide a detailed submittal for review and approval by the Engineer prior to installation.

3.8 DUST CONTROL

- A. Apply water uniformly over the surface when dust becomes a nuisance or when directed by the ENGINEER. Provide shut-off valve in convenient location on water truck, to allow for regulating water flow.

3.9 MAINTENANCE

- A. Inspect control system at least once per week, immediately after each rainfall and daily during prolonged rainfall. Make repairs immediately.
- B. Remove and dispose of accumulated sediments when sediment reaches approximately one-third the height of the control system, or when directed by the ENGINEER.

- C. Replace control system promptly if fabric decomposes or system becomes ineffective prior to the expected usable life.
- D. Maintain or replace system until no longer necessary for the intended purpose.

3.10 REMOVAL OF TEMPORARY FACILITIES

- A. Do not remove erosion control facilities without written approval from Engineer.
- B. All erosion control facilities will be the property of Contractor and shall be removed and disposed of offsite after all Work is complete.
- C. Remove and dispose of sediments collected in the sediment control systems in accordance with Section 01 50 0: TEMPORARY FACILITIES AND CONTROLS.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and Payment shall be made on a Lump Sum Basis for the work in this Section. Payment will be made on a prorated basis commensurate with percent of E&S control installed and accepted.

ITEM	DESCRIPTION	UNIT
015719	Temporary Sediment and Erosion Control	LS

END OF SECTION

**SECTION 01 57 19
PROJECT PERMITS AND ENVIRONMENTAL CONTROLS**

PART 1 GENERAL

1.1 WORK INCLUDES

- A. Project Permits.
- B. Abatement of Air Pollution.
- C. Abatement of Noise Pollution.
- D. Abatement of Water Pollution.
- E. Landscape Preservation.
- F. Preservation of Trees and Shrubs.
- G. Preservation of Historical and Archaeological Data.
- H. Protection of Endangered Species.
- I. Allowable Work Hours

1.2 SUBMITTALS

- A. Shop Drawings:
 - 1. Prior to the start of construction, provide copies of any necessary local or state permits required to complete the Work.

1.3 PROJECT PERMITS

- A. Comply with OWNER OBTAINED PERMITS in ATTACHMENT A and in Section 01 14 00 SPECIAL PERMIT RESTRICTIONS AND UTILITY AUTHORIZATIONS. Copies of all Owner-obtained permits are included in Attachment A
- B. Contractor shall obtain all other incidental permits required for the Work.
- C. If the aggregate storage of oil at the Site is over 1,320 gallons or a single container has a capacity in excess of 660 gallons, prepare a Spill Prevention Control and Countermeasure (SPCC) plan. The plan shall be prepared and certified by a Registered Professional Engineer registered in the State of Connecticut.
- D. All oil storage tanks shall be placed at least 20 feet from streams, flowing or dry watercourses, lakes, wetlands, reservoirs, and any other water source, and the area surrounding the tanks shall be diked to contain more than 1-1/2 times the volume of the largest tank, or more than half the volume of all tanks within the diked area, whichever is greater. Underground storage tanks shall be used only upon submission and approval of a written management plan documenting all necessary regulatory compliance.

1.4 ABATEMENT OF AIR POLLUTION

- A. Abatement of air pollution shall be performed in accordance with the requirements of the Air Pollution Emission Permit and applicable Laws and Regulations concerning the prevention and control of air pollution. Use such methods and devices as are reasonably

available to prevent, control, and otherwise minimize atmospheric emissions or discharges of air contaminants.

- B. Burning of cleared materials, combustible construction materials, and rubbish will not be allowed.
- C. Apply a dust-preventive treatment or periodically water access and haul roads to prevent dust.

1.5 ABATEMENT OF NOISE POLLUTION

- A. Abatement of noise pollution shall be performed in accordance with local noise ordinances regarding the prevention, control, and abatement of harmful noise levels.

1.6 ABATEMENT OF WATER POLLUTION

- A. CONTRACTOR active on site must sign certification that they are familiar with and will follow the CT DEEP –Discharge of Stormwater and Dewatering From Construction Activities – General Permit and the Stormwater Pollution control Plan, if applicable to the project.
- B. Excavated materials or other construction materials shall not be stockpiled or wasted near or on streambanks, lake shorelines, or other watercourse perimeters where they can be washed away by high water or storm runoff, or can in any way encroach upon the watercourse itself.
- C. Include prevention measures to control silting and erosion, and to intercept and settle any runoff of sediment-laden waters. Refer to Section 01 57 13: TEMPORARY EROSION AND SEDIMENT CONTROL. Wastewater from general construction activities, such as drain water collection, drilling, grouting, or other construction operations, shall not enter flowing or dry watercourses without the use of approved turbidity control methods.

1.7 LANDSCAPE PRESERVATION

- A. Preserve the natural landscape, and conduct operations so as to prevent unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the Work. Movement of crews and equipment within the rights-of-way and over routes provided for access to the Work shall be performed in a manner to prevent damage to property. When no longer required, construction roads shall be restored to original contours and made impassable to vehicular traffic.

1.8 PRESERVATION OF TREES AND SHRUBS

- A. Preserve and protect existing vegetation not required or otherwise authorized to be removed. Vegetation shall be protected from damage or injury caused by CONTRACTOR construction operations, personnel, or equipment by the use of protective barriers or other methods. Removal of existing vegetation not specifically required to be removed will require prior approval by ENGINEER.

1.9 PRESERVATION OF HISTORICAL AND ARCHAEOLOGICAL DATA

- A. Should CONTRACTOR, or any of CONTRACTOR's employees, or parties operating or associated with CONTRACTOR, in the performance of this Contract discover evidence of possible scientific, prehistorical, historical, or archeological data, immediately cease

work at that location and notify ENGINEER, giving the location and nature of the findings. Forward written confirmation to OWNER within 2 days. Exercise care so as not to disturb or damage artifacts or fossils uncovered during excavation operations, and provide such cooperation and assistance as may be necessary to preserve the findings for removal or other disposition by OWNER.

- B. Where appropriate by reason of discovery, ENGINEER may order delays in the time of performance or changes in the Work, or both. If such delays or changes are ordered, an equitable adjustment will be made in the Contract in accordance with the applicable clauses of the Contract.

1.10 PROTECTION OF THREATENED AND ENDANGERED SPECIES

- A. Conform to requirements of applicable project permits, approvals, and local, state and federal laws, regulations and ordinances.
- B. Because the site is in an area designated by CT DEEP as an “NDDB” area, there may be Threatened and Endangered Species on the project site.
- C. Unknown Threatened and Endangered Species
 - 1. If CONTRACTOR, any of CONTRACTOR’s employees, or parties operating or associating with CONTRACTOR in the performance of this Contract, discover evidence of endangered or threatened species during construction:
 - a. Immediately cease work at that location.
 - b. Notify ENGINEER and OWNER of the location and nature of the findings within 24 hours.
 - c. Do not disturb the discovered species or damage habitat.
 - d. Cooperate and assist to relocate the species or other disposition by OWNER.
 - 2. Where appropriate by reason of a discovery, ENGINEER may order delays in time of performance or changes in the Work, or both.
 - a. If such delays, or changes, or both, are ordered, the time of performance and Contract Price will be adjusted in accordance with the applicable clauses in the Contract.

1.11 ALLOWABLE HOURS OF WORK

- A. Due to adjacent residences and ongoing park usage, Work Hours will have limitations.
- B. Normal Work Hours will be from 7 AM to 5 PM Monday through Friday.
- C. Permission from the OWNER will be required for any work to be performed outside of the normal Work Hours, or on Holidays or Weekends.
- D. Work may also be limited during times when special park events are scheduled.

- E. CONTRACTOR's submitted schedule will be reviewed by the OWNER who will identify and dates where work may need to be restricted due to special park events.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for the work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

END OF SECTION

SECTION 01 77 00
PROJECT CLOSEOUT

PART 1 GENERAL

1.1. CLEANING

- A. Before inspection for substantial completion, do all necessary cleaning, including the following:
 - 1. Remove all Erosion and Sediment control, surplus material, debris etc., from site.
 - 2. Sweep exterior paved surfaces, rake clean other site surfaces.
 - 3. Refer to specification sections for additional requirements for particular surfaces.

1.2. SUBSTANTIAL COMPLETION AND FINAL INSPECTION

- A. Submit written certification that project, or designated portion of project, is substantially complete, and request, in writing, a final inspection. The Owner will make an inspection within 10 days of receipt of request.
- B. Should the Owner determine that the work is substantially complete, he will prepare a punch list of deficiencies that need to be corrected before final acceptance and issue a notice of substantial completion with the deficiencies noted.
- C. Should the Owner determine that the work is not substantially complete, he will immediately notify the Contractor, in writing, stating reasons. After Contractor completes work, he shall re-submit certification and request for final inspection.

1.3. CLOSE-OUT SUBMITTALS

- A. Completed project record documents specified in SUBMITTALS, SECTION 013300.
- B. Certificate of insurance for products and completed operations.
- C. Typed list of major subcontractors and suppliers with addresses and telephone numbers.
- D. Submissions specified elsewhere in Contract Documents, including consent of surety to final payment; affidavit that all bills and indebtedness connected with the Work have been paid; and certification of payment from subcontractors and suppliers, or bond satisfactory to the Owner indemnifying the Owner against liens or other claims.
- E. As-Built plans indicating key elements of the project and any deviation from project design, specifications, or permit conditions.

1.4. ACCEPTANCE OF THE WORK

- A. After all deficiencies have been corrected, a Letter of Final Acceptance will be issued. If only designated portions of the project have been inspected, a Letter of Partial Acceptance will be issued for that portion of the Work.
- B. Acceptance may be given prior to correction of deficiencies that do not preclude operation and use of the facility; however, final payment will be withheld until all deficiencies are corrected.
- C. Until receipt of Letter of Final Acceptance, Contractor shall be responsible for the work of this Contract.

1.5. POST-CONSTRUCTION INSPECTION

- A. Prior to expiration of one year from date of final acceptance, the Owner will inspect the project to determine whether corrective work is required. Contractor will be notified in writing of all deficiencies. In accordance with terms of the General Conditions, corrective work must start on noted deficiencies within 10 days of receipt of notification to Contractor.

PART 2 PRODUCTS

(Not Applicable).

PART 3 EXECUTION

(Not Applicable).

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

*** END OF SECTION ***

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Examine all Drawings, all Sections of the Specifications, and all material test reports for requirements and provisions affecting the work of this Section.

1.2 SCOPE OF WORK

- A. Examination of Existing Conditions: The Contractor shall examine the Contract Documents and bid attachments for demolition and removal requirements and provisions for new work. Verify all existing conditions and dimensions before commencing work. If there is a conflict between the Contract Documents and Bid attachments, Contractor shall notify the Owner and Engineer and shall comply with the Owner's resolution of the conflict. To discover and resolve either conflicts or lack of definition that might create demolition problems, the Contractor shall submit any questions regarding the extent and character of the demolition and removal work in the manner and within the time period established for receipt of such questions during the bidding period.
- B. Should drawings not agree within themselves or the specifications, the greater quantity, or superior quality of work or materials shall be included.
- C. Work under this Section, without limiting the generality thereof, consists of providing all materials, equipment, labor, storage, transportation facilities, and all other incidentals as indicated on the Contract Drawings, stipulated in the Specifications and as reasonably implied by either or both for the complete removal and disposal of the following:
1. Sequence work and maintain stability of all existing structures and slopes during demolition.
 2. All demolition work required or specifically called for on the Contract Drawings and additionally as required to accommodate the proposed work including, but not limited to:
 - (a) Timber overlooks
 - (b) Concrete walkways
 - (c) Stairs: concrete and timber
 - (d) Unless noted otherwise, demolish and dispose of any structures, fences, concrete pads or bituminous pavement encountered within the limits of demolition shown on the Contract Drawings.
 - (e) All demolition work required or specifically called for on the Contract Drawings and additionally as required to accommodate the proposed work including, but not limited to demolition and disposal of the following:
 - (1) Cutting, removal, and disposal of asphalt pavement
 - (2) Cutting, removal, and disposal of reinforced and unreinforced concrete slabs or foundations interfering with the proposed work
 - (3) Excavation and removal of stone within 5' of mudline to install piles
 - (4) Cutting, removal and disposal of timber interfering with the proposed work
 - (5) Shoring of excavation

- D. Removal from site and legal disposal of all materials, trash, debris, etc., dismantled and/or removed by demolition operations, except any items specifically to remain the property of the Owner.
- E. Incidental materials necessary for the completion of the work in this section and usually furnished in connection therewith, shall be furnished and installed whether or not specifically mentioned.
- F. All existing removed materials, items, trash, and debris under this item shall become property of the Contractor and shall be completely removed from the Site and legally disposed of at the Contractor's expense. Salvage value belongs to the Contractor. On-site sale of materials is not permitted.
- G. Recycling of all materials to the extent practical.
- H. Obtaining all necessary permits, providing necessary notifications, and complying with all local, state, and federal laws regarding safety and demolition.
- I. The control of noise and dust.
- J. The protection of adjacent structures, sidewalks, and other features outside the limits of the work of this specification.
- K. Prevention of pollution to waterways.

1.3 CODES, STANDARDS, ORDINANCES AND PERMITS

- A. Perform all work in strict accordance with all rules, regulations, standards, codes, ordinances, or laws of local, state, and Federal authorities having lawful jurisdiction, and be responsible for compliance therewith. Such authorities include but are not limited to the following:
 - 1. The Connecticut State Building Code
 - 2. ANSI/ASSE A10.6 "Safety Requirements for Demolition Operations"
 - 3. NFPA 241 "Standard for Safeguarding Construction, Alteration, and Demolition Operations".
 - 4. Other federal, state, and local statutes, ordinances, regulations, or rules pertaining to this Section and the work described herein.
 - 5. All regulations by the above and other governing agencies in their most current version are applicable throughout this project. It is the Contractor's responsibility to know, understand, and abide by all such regulations and practices. Where there is a conflict between this Specification and the cited state, federal, or local regulations, the more restrictive or stringent requirements shall prevail.
- B. The Contractor shall give the proper Authority all requisite notices and secure and pay all permits, licenses, inspections, and certificates relating to his work.
- C. All work performed and all equipment and materials furnished and/or installed shall be in accordance with all standards as hereinafter specified. All standards shall be of the latest edition.

1.4 QUALIFICATIONS

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

1.5 SUBMITTALS

- A. Before beginning work, submit a Demolition Plan containing the following:
1. Introduction describing work to be done.
 2. Detailed sequence of demolition to ensure stability of all existing structures and the existing shoreline. All requirements for temporary support shall be the responsibility of the Contractor at no additional cost to the Owner.
 3. Detailed schedule of demolition and removal work, with early and late starting and finishing dates for each activity.
 4. Details of falsework, staging, or other containment as required to catch and remove demolition debris in accordance with the environmental permits
 5. Description of proposed demolition methods and protection for adjacent areas not being demolished
 6. Description of equipment (including cut sheets).
 7. Locations of proposed dust- and noise-control temporary partitions and means of egress.
 8. Proposed disposal facility for each category of demolition materials
 9. Methods for maintaining dust control.
 10. Methods for monitoring and controlling noise.
 11. Safety precautions to be undertaken during operations.
 12. Evaluation of existing structures by an engineer to confirm that loads to be encountered during demolition activities can be adequately supported by the structures.
 13. Site Security Plan
 14. Dust Control Plan
 15. Health and Safety Plan.
- B. Landfill Records: Provide a Waste Management Report that includes the location and quantity of material disposed of, and the quantity diverted from disposal for recycling, salvage, or reuse. Include trip tickets (receipts) indicating receipt and acceptance of wastes by each disposal facility or recycling, salvage, or reuse facility licensed to accept said wastes.
- C. Provide a copy of all permits, completed shipping manifests, and destruction certificates to the Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services. Coordinate with utility providers and the Owner and terminate utilities according to the providers' requirements.

1. Prior to commencing cutting work in existing surfaces, take all precautionary measures to assure that utility services to the area have been made inactive. Only licensed tradesmen of that trade shall disconnect and cap existing mechanical and electrical items that are to be removed, abandoned and/or relocated.
2. If, during the process of cutting work, existing utility lines are encountered which are not indicated on the Drawings, regardless of their condition, immediately report such items to the Engineer. Do not proceed with work in such areas until instructions are issued by the Engineer. Continue work in other areas

3.2 PREPARATION

- A. Bidders shall examine the site and make their own estimates of the types and quantities of demolition, which will be required to fulfill the contract requirements.
- B. Provide proper notification of demolition, removal, and disposal, of hazardous building materials identified during work as required by local, state, and federal regulations. The Owner and Engineer are not responsible for work by the Contractor that is performed with improper notice.
- C. Site Access and Temporary Controls: Conduct demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- D. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 1. Strengthen or add new supports when required during progress of demolition.
 2. Remove temporary shoring, bracing and structural supports when no longer required.
 3. Post warning signs and place barricades as applicable during placement and removal of temporary shoring.
- E. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area(s).
 1. Erect temporary protection, such as walks, and fences, where required by authorities having jurisdiction or as shown on the plans. Provide temporary barricades as required to limit access to demolition areas.
- F. Not anticipated however, notify the Owner and the Engineer immediately if ACM, LBP, PCBs, CFCs, and mercury are encountered. If encountered:
 1. Prepare and manage materials containing ACM, LBP, PCBs, CFCs, and mercury in accordance with applicable local, state, and federal regulations.
- G. Manage and dispose of materials in accordance with applicable local, state, and federal regulations.
- H. Remove, stockpile, and dispose of all treated timber.
 1. Perform all sampling and laboratory testing necessary to characterize the treated timber components for disposal.

2. Load, transport, and dispose of the treated timber components at an appropriate disposal facility licensed to accept treated wood products. Submit disposal manifests to the Engineer prior to the completion of the project.
- I. Any additional applicable pre-disposal testing requirements of the receiving facility of the demolition debris, or as required by any applicable codes or regulations, shall be identified and performed by the Contractor. The Contractor is responsible for determining the demolition procedures and the resulting required testing and disposal required to comply with all applicable codes and regulations.

3.3 APPLICATION

- A. The work shall be conducted with prime consideration given to the following:
 1. Compliance with applicable laws and building codes.
 2. Safety, protection, and convenience of the Owner's tenants, public, and workmen.
 3. Minimization of dirt and dust proliferation.
 4. Protection of the existing building structure, materials, and finishes from damage.
 5. Neat and accurate cutting and trimming of elements to be partially removed, subject to Engineer's approval.
- B. All work shall be done in accordance with applicable Federal, State and local laws, rules, regulations, codes and ordinances and all necessary permits required for the demolition work shall be procured by the General Contractor.
- C. All materials removed during demolition designated for disposal shall become the property of the Contractor unless otherwise noted.
- D. All materials removed during demolition, except that which are to be reused, shall be disposed of off the site in conformance with all municipal, state and federal regulations.
- E. Do not work in affected areas until the various dust and protective barriers have been installed.
- F. Contractor shall be responsible for all concrete saw cutting and removal and disposal of material.
- G. Debris shall not be allowed to accumulate and shall be sprinkled during handling and loading to reduce dust. All debris shall be either stored temporarily in Contractor furnished dumpster type container(s) provided by the Contractor at his expense, or shall be removed from the site daily, to ensure absolute minimization of dusting and other pollution. Segregate debris as required for disposal.

3.4 DEMOLITION

- A. General: Completely demolish and remove existing construction, including below grade features as shown on the plans. Use methods required to complete the work within limitations of governing regulations.
 1. Proceed with demolition systematically.
 2. Dispose of demolished items and materials promptly in accordance with the requirements of this specification and all applicable local, state, and federal regulations.

B. Material Segregation

1. Separate Asphalt, Brick and Concrete (ABC) rubble from wood, and steel.

3.5 PROTECTION OF PUBLIC AND PROPERTY

- A. Provide all measures required by federal, state, and municipal laws, regulations, and ordinances for the protection of surrounding property, the public, and workmen during all demolition and removal operations. Measures are to be taken, but not limited to installation of sidewalks, sheds, barricades, fences, warning lights and signs, trash chutes, and temporary lighting.
- B. Protect all buildings, fences, walks, roads, streets, curbs, pavements, trees, plantings, utilities, and other features on and off premises. Should any such items be damaged by the Contractor during the execution of the work, the Contractor shall bear all costs for correcting such damage as directed by the Engineer, and to the satisfaction of the Owner.
- C. Perform demolition in a manner that will ensure the safety of adjacent property. Protect adjacent property from damage and protect persons occupying adjacent property from injuries which might occur from falling debris or other causes. Do not interfere with the free access and safe passage to and from the same.
- D. Prevent movement or settlement of sidewalks, roads, streets, curbs, and pavements. Install all necessary bracing and shoring in connection with demolition and removal work.

3.6 DISCOVERY OF HAZARDOUS MATERIALS

- A. If hazardous materials or unmarked containers are discovered, cease work in the affected area and immediately notify the Engineer and the Owner. Do not proceed with work in such areas until approved by the Owner. Continue work in other areas.
 1. Prepare and submit the Hazardous Materials Management Plan
- B. If Asbestos Containing Materials are identified allow for 10-day asbestos notification prior to start of asbestos abatement.
 1. Handle, manage, and dispose of Asbestos Containing Materials in accordance with the requirements of this specification and applicable local, state, and federal regulations.

3.7 CUTTING

- A. Contractor shall be responsible for all concrete saw cutting and removal and disposal of material
- B. Provide a flush, full depth saw cut edge where pavement, curb, and concrete removals abut existing surfaces to remain undisturbed
- C. Take care to avoid damage to existing structures or part structures to remain as noted within the Contract Documents.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. General:

1. Do not burn demolished materials.
2. Do not allow demolished materials to accumulate on-site.
3. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Manage and dispose of materials in accordance with applicable local, state, and federal regulations.

3.9 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Leave premises in a clean condition.

PART 4 MEASUREMENT AND PAYMENT (PENDING – IN PROCESS)

4.1 MEASUREMENT AND PAYMENT

A. METHOD OF MEASUREMENT

1. DEMOLITION shall be measured and paid by the lump sum and shall be measured once for the Contract. This pay item shall include all demolition not called out for individual measurement and payment within the limits shown on the Contract Drawings.

B. METHOD OF PAYMENT

1. Payment for DEMOLITION shall be by Contract Unit Price LUMP SUM and shall be full compensation for furnishing all necessary labor, equipment, materials, preparation, testing, transportation, survey, and supervision to successfully remove, any items noted on drawings for demolition, and any items encountered necessary to complete the work specified herein and as shown on the Contract Drawings. Bidders shall examine the site and make their own estimates of the types and quantities of demolition, which will be required to fulfill the contract requirements

C. PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
02 41 00-01	Demolition	LS

*** END OF SECTION ***

SECTION 03 01 00
CONCRETE REPAIR

PART 1 GENERAL

1.1 WORK INCLUDES

- A. Provide all layout, products, materials, equipment, tools, services, transportation, supervision, and labor to complete all concrete rehabilitation and repairs required to complete the work as shown on the drawings and including the following:
 - 1. Concrete Surface Cleaning (Pressure Wash Cleaning)
 - 2. Concrete Crack Repair
 - 3. Concrete Repairs
 - 4. Doweling & Reinforcement
 - 5. Steel Reinforcement Corrosion Protection
 - 6. Expansion Joint Sealant Repairs

1.2 SUBMITTALS

- A. Confirm that the information provided on the drawings and in these Specifications is an accurate representation of actual field conditions. Prior to all work, verify the extent, quantity, and method of repair. Notify ENGINEER of any conflicts with drawings or Specifications.
- B. The CONTRACTOR shall develop procedures that will be used to make the concrete repairs. The procedure shall include equipment, tools and materials the CONTRACTOR will use to execute this work. The procedure should include means, methods, products, and procedures including but not limited to the following:
 - 1. Concrete Surface Cleaning (Pressure Wash Cleaning)
 - 2. Concrete Crack Repair Type 1
 - 3. Concrete Crack Repair Type 2
 - 4. Concrete Crack Repair Type 3
 - 5. Concrete Crack Repair Type 4
 - 6. Concrete Spall Repair Type 1
 - 7. Concrete Spall Repair Type 2
 - 8. Deep Concrete Repairs
 - 9. Expansion Joint Sealant Repairs
- C. Manufacturer's literature, including:
 - 1. Product Data Sheets
 - 2. Material Safety Data Sheets (MSDS).
 - 3. Mill test certificates for reinforcing material

1.3 REFERENCES

- A. Pertinent provisions of the most recent codes and standards by the following organizations shall apply to the work of this Section, except as they may be modified herein, and are hereby made a part of this Specification to the extent required.
 - 1. American Concrete Institute (ACI), including winter and summer concrete practices.
 - 2. American Society for Testing and Materials (ASTM)
 - 3. Concrete Reinforcing Steel Institute (CRSI)
 - 4. International Concrete Repair Institute (ICRI)
- B. Where these Specifications differ from the requirements of ACI, ICRI or ASTM, the more stringent requirements shall apply.

1.4 QUALITY ASSURANCE

- A. CONTRACTOR shall provide at least one person who shall be present at all times during execution of this portion of work and who shall have demonstrated successful prior experience with repair techniques, materials being installed, referenced standards, and requirements of this work.
- B. The material supplier must have trained personnel available to provide technical assistance to the CONTRACTOR at the site, when requested.

PART 2 PRODUCTS

2.1 CONCRETE CRACK REPAIR PRODUCTS

- A. Injection adhesive shall conform to the requirements of ASTM C881, Type IV, Grade 1 and be Sikadur 35 Hi-Mod LV or approved equal epoxy resin.
- B. Surface seal for sealing of cracks and porting devices shall have the strength and adhesion to contain the injection adhesive in the crack during the injection process and while the injection adhesive cures, and when removed, shall not leave a residue or damage the surfaces. The surface seal shall be Sikadur 31 Hi-Mod Gel or approved equal. Note: epoxy injection is for dry conditions in the concrete.
- C. Porting devices – As required for either manual or automated application as specified by the epoxy resin adhesive manufacturer.

2.2 REPAIR MORTAR FOR CONCRETE SPALL REPAIR TYPE 1 (<1.5")

- A. Repair mortar for vertical repairs less than 1.5 inches deep shall be SikaQuick VOH by Sika Corporation or approved equal.
- B. Repair mortar for horizontal repairs less than 1.5 inches deep shall be SikaQuick 1000 by Sika Corporation or approved equal.

- 2.3 REPAIR CONCRETE FOR CONCRETE SPALL REPAIR TYPE 2 (1.5" TO 8" DEEP)
- A. Repair concrete for vertical and horizontal repairs 1.5 inch to eight inches deep shall be Sikacrete 211 by Sika Corporation or approved equal.
 - B. Forms for repairs shall be BB form grade plywood and walers as required to prevent bulging.
- 2.4 STRUCTURAL CONCRETE FOR DEEP CONCRETE REPAIRS (>8" DEEP)
- A. Structural Concrete shall be Sikacrete 100 CI as manufactured by Sika Corporation (Or approved equal).
 - 1. Minimum Comprehensive Strength = 4,000 psi at 28 days.
 - 2. Sikacrete 100 CI does not require extension. Place via form and pour/pump. .
 - 3. Follow all procedures outlined by the manufacturer, including surface preparation of existing concrete surface.
 - 4. Working time shall be 25 - 45 minutes or as described by manufacturer's specifications.
 - 5. Water content should not exceed manufacturer's specifications.
 - 6. Wet cure concrete as soon as material reaches final set. Keep continuously wet for a minimum of 4 hours or as directed by the ENGINEER to a maximum of 24 hours.
- 2.5 ANTI-CORROSION REBAR COATING AND PRIMER (BONDING AGENT)
- A. Coating shall be a three component, microsilica water-based epoxy resin/portland cement anti-corrosion coating such as Armatec 110 EpoCem by Sika Corporation or approved equal. Corrosion protection shall be by same manufacturer as repair mortar and concrete.
- 2.6 CURING COMPOUND
- A. Curing compound shall be water dissipating, high solids content, that shall meet the requirements of ASTM C 309 and ASTM C 1315. Acceptable curing compounds include SIKA Antisol 250W, or equal.
- 2.7 EXPANSION JOINT SEALANT (JOINTS UP TO 1.5" WIDE)
- A. Sikaflex-2C NS EZ Mix manufactured by Sika Corporation of Lyndhurst, NJ or Approved equal. The Joint Sealant shall be a 2-component, non-sag, premium-grade, polyurethane-based, elastomeric sealant that meets ASTM C-920, Type M, Grade NS, Class 25. Sealant shall be properly pigmented to resist UV degradation.
 - B. Apply a primer to concrete substrate prior to placing sealant. Primer shall be Sikaflex 429 primer as manufactured by Sika Corporation of Lyndhurst, NJ or Approved equal.

2.8 PREFORMED EXPANSION JOINT SEAL REPAIR (GREATER THAN 1.5" WIDE)

- A. Preformed expansion joint seal shall be EMSEAL BEJS (Bridge Expansion Joint System) manufactured by Sika Corporation of Lyndhurst, NJ, or approved equal. The seal shall be designed and manufactured to be a primary seal for high-movement expansion joints and shall be a pre-compressed joint seal material.
- B. The joint seal shall provide a watertight seal in horizontal and vertical-plane expansion joints and have the ability to sustain water submergence for extended periods of time.
- C. Contractor shall provide submittal of proposed material based on consultation with manufacturer for the specific application. Product must meet the applicable ASTM requirements for water penetration and water submergence.

2.9 STEEL REINFORCING MATERIALS

- A. Reinforcing Steel: ASTM A 615, Grade 60, deformed bar, uncoated; ASTM A 706, Grade 60, deformed bar, uncoated for reinforcing steel to be welded.

2.10 BONDING AGENT

- A. Bonding Agent shall be Arimatec 110 EpoCem by Sika Corporation (or approved equal). Bonding Agent shall be by same manufacturer as concrete.
- B. Bonding Agent shall be applied as described by manufacturer's specifications.

2.11 EPOXY ANCHOR GROUT

- A. Epoxy grout shall come in two-chambered cartridge with a metering system that provides the proper ratio of hardener and resin. The grout shall also come with a static mixer nozzle to thoroughly mix the hardener and resin together.
- B. Epoxy anchor grout shall be Sika AnchorFix 3001 by Sika Corporation or approved equivalent.

2.12 CONCRETE SURFACE APPLIED CORROSION INHIBITOR AND SEALER

- A. Surface applied corrosion inhibitor and sealer treatment to be used for all concrete repair areas shall be Sika Ferrogard 908 or approved equal meeting the requirements of ASTM G109 and USBR-M82. Corrosion inhibitor/sealer shall be applied to the repaired concrete area and extend a minimum of 1 foot in all directions onto the existing concrete surface (or to the nearest joint or corner) in straight lines, in order to achieve a neat and uniform appearance.

2.13 WATER TO BE USED FOR CONCRETE REPAIR PRODUCTS

- A. For all products described above that require dilution, mixing, or cleaning with water, the water shall be obtained from a potable source. Water shall be kept free from contaminants until introduced into the process as described. River water shall not be used in association with any work activities described in this section. The

CONTRACTOR shall provide a submittal indicating the source of potable water to be used.

PART 3 EXECUTION

3.1 GENERAL

- A. The locations and general extent of the repairs described in this specification are as shown on the project plans. The ENGINEER will be responsible for determining any adjustments needed to the repair extents or to accommodate the particular existing conditions encountered at each repair location. The ENGINEER may mark additional locations for repair.

3.2 SURFACE PREPARATION

- A. Concrete surfaces must be entirely free of oil, grease, paint, corrosion deposits, efflorescence, dust, laitance, and other surface contaminants. All dust or deposits produced during these procedures must be removed.

3.3 CONCRETE SURFACE CLEANING (PRESSURE WASH CLEANING)

- A. The surface areas designated shall be thoroughly cleaned to remove efflorescence and staining using a combination of cleaning solutions and high pressure washing.
- B. In addition to appearance, the purpose of the cleaning is to allow for inspection of concrete condition needed to identify further repairs to be designated by the ENGINEER, including crack repairs, concrete spall, or deep concrete repairs.
- C. Apply cleaning agent in accordance with manufacturers recommended procedures.
- D. Pressure wash to remove efflorescence, staining, and graffiti.
- E. Repeat cleaning process described above until all efflorescence, staining, and graffiti is removed from the surface, and to the satisfaction of the ENGINEER.
- F. Whenever acid is used, the surface should be thoroughly rinsed with water as soon as its action has been adequate. Otherwise it may continue etching the concrete.
- G. Care shall be taken when pressure washing to avoid damaging concrete due to excessive pressures. In order to avoid concrete damage, the maximum pressure shall generally be 3,000 psi using a 40 degree fan tip. The contractor shall perform a test section that will be witnessed by the Engineer in order to confirm that power washing at the specified pressure will not damage the concrete.
- H. Remove and dispose of all paint, loose cement, debris generated.
- I. The specific cleaning solutions, pressure washing parameters, and other details of the cleaning shall be provided in the Contractor's Work Plan. Cleaning under this activity shall not proceed until approved by the ENGINEER in writing.

3.4 CONCRETE CRACK REPAIR

- A. TYPE 1 (MECHANICALLY CLEANING EFFLORESCENCE)

1. The surface over the entire length of the crack should be mechanically cleaned such as power wire brushed to remove laitance or any other deleterious materials from the concrete. Remove all debris.
 2. Apply cleaning agent as needed in accordance with manufacturers recommended procedures.
 3. Whenever acid is used, the surface should be thoroughly rinsed with water as soon as its action has been adequate. Otherwise it may continue etching the concrete.
 4. Continue mechanical cleaning process until all efflorescence and staining is removed from the surface and area immediately surrounding the crack to allow crack repairs to proceed.
- B. TYPE 2 (PRESSURE INJECTED)
1. Includes Type 1 Repair.
 2. Follow injection adhesive manufacture's guidelines and these specifications. In case of conflict, follow manufacture's guidelines.
 3. Set porting devices as required to ensure the injection adhesive fills the cracks between ports. On structures open on both sides, provide porting devices on opposite sides at staggered elevations.
 4. Apply the surface seal over cracks and around each porting device to provide an adequate seal to prevent the escape of the injection adhesive. Apply the surface seal in such a manner that minimal defacing or discoloration of the substrate shall result. Allow the surface seal adequate time to cure, as per the manufacturer's guidelines, prior to injection.
 5. Mix the injection adhesive with equipment or tools that are able to establish and maintain a ratio of the components within +/-3% of the nominal mixture ratio specified by the manufacturer of the adhesive. Mix only that quantity of material that can be used within its pot life.
 6. Pressure Injection:
 7. Vertical: For cracks generally in an inclined or vertical plane, start injecting at the lowest elevation of the crack. Ten minutes after initial injection has been completed at the highest elevation port, re-inject at that port until no additional adhesive can be injected. Repeat the reinjection procedure, moving from highest to lowest port until all ports refuse injection adhesive.
 8. Horizontal: For cracks generally in a horizontal plane, start injecting at the lowest end of the crack. Ten minutes after initial injection has been completed, re-inject all ports. Repeat injection procedure until all ports refuse injection adhesive.
 9. If penetration of any cracks is impossible, consult the ENGINEER before discontinuing the injection procedure. If modification of the proposed procedure is required to fill the cracks, submit said modification in writing to the ENGINEER for acceptance prior to proceeding.
 10. Allow the injection adhesive to set or cure per the manufacturer's instructions.
 11. Remove surface seal and any installed injection ports that protrude from the surface of the concrete.

12. Clean and remove all spills and leaks of injection adhesive and stains caused by the injection adhesives.
- B. TYPE 3 (CORNER JOINT)
1. Includes Type 1 and 2 Repair
 2. Type 3 repair is for surfaces located in areas that ports may not be able to mount flush on the surface, such as cracks at a joint between two walls or a wall and floor. Use the appropriate “L” shaped flange ports for cracks occurring between two walls or a wall and floor. Additional work will be needed to set the ports and inject the adhesive.
 3. Drill access holes at angle to intersect crack. Drill hole should be located in area outside of crack where port installation is not feasible.
 4. For walls accessible from both sides, drill holes should be located on both sides of the crack.
 5. Follow procedures outlined in Concrete Crack Repair Type 2 for crack surface seal, crack injection and clean up.
 6. CONTRACTOR may submit alternate procedures for Concrete Crack Repair Type 3. Alternates must be approved by the ENGINEER.
- C. TYPE 4 (LOW PRESSURE INJECTED)
1. Includes Type 1 and 2 Repair.
 2. Concrete Crack Repair Type 4 is located at the outside corner of walls.
 3. The CONTRACTOR shall take all necessary precautions to prevent additional damage to or displacement of the concrete, masonry, or other adjacent materials. Use low pressure to inject the resin adhesive.
 4. Any damage that occurs during injection of the concrete cracks will be repaired at the CONTRACTOR’S expense.

3.5 REMOVAL OF DETERIORATED CONCRETE

- A. Remove deteriorated concrete using appropriate mechanical means to obtain an aggregate fractured surface with minimum surface profile of +/- 1/4 inch equivalent to an ICRI CSP-7 (International Concrete Repair Institute – Concrete Surface Profile, 7 on a 1 thru 10 scale). Mechanical concrete removal shall be limited to those methods that will not cause excessive micro fracturing. This shall typically be accomplished by use of hand-held chipping hammers in the range of 15 to 20 pounds, air chisels, hand-held needle scalers, or equivalent. Jack hammers typically intended for flat surfaces (i.e. 60 to 80 pound hammers) will not be allowed due to excessive force. The CONTRACTOR shall provide a submittal for the specific type of hammer(s) to be used which shall be subject to approval by the ENGINEER.
- B. The edges of the area to be repaired shall be perpendicular to the concrete surface. Provide a 1/2” inch deep saw cut around the perimeter of the repair. Some sound concrete may have to be removed to provide a repair of nearly uniform depth at the direction of the ENGINEER.
- C. When there are existing reinforcing bars included in a repair area, sufficient concrete shall be removed to provide a minimum of one inch of clearance all around the bars

and expose the reinforcing back to the point where a splice to uncorroded bar can be made.

- D. Removed concrete shall be disposed of off-site at an approved location in accordance with all applicable regulations.

3.6 REINFORCING CORROSION PROTECTION

- A. Embedded steel shall be cleaned of corrosion by sandblasting or power wire brushing to remove loose rust and clean down to bare metal.
- B. Coat reinforcing with anti-corrosion/bonding coating as defined above.
- C. Anti-corrosion/bonding coating shall be allowed the minimum curing time and no more than the maximum curing time as specified by the product manufacturer. Anti-Corrosion/Primer shall only be applied when there is no rain in the forecast for the minimum period of time specified by the manufacturer, or as directed by the engineer.

3.7 REPAIR OF DAMAGED OR CORRODED REINFORCMENT

- A. Damaged or corroded reinforcement, as determined by the ENGINEER, shall be repaired by lap splicing new bars, developed on both ends of the damaged area.
- B. Where insufficient space is available to develop the splice, the damaged bars shall be repaired by lap welding ASTM A36 bars on both sides of the damaged bar. Unless otherwise specified, weld length shall be 12 bar diameters when two welds are provided, and the cross-sectional area of each fillet weld shall be at least 33 percent of the bar area. For larger bars, butt-welded joints may be allowed at the discretion of the ENGINEER.
- C. Prior to welding of rebars and at the ENGINEER's discretion, a procedure shall be developed by the CONTRACTOR, based on test welds performed using coupons from the existing reinforcement, lap welded to new ASTM A36 bars or butt welded. If required, the procedure shall be subject to review by the ENGINEER. Concrete surfaces shall be protected from flame and excessive heat during preheating of reinforcing bars, and shall be maintained in a damp condition. All welders involved in the welding of reinforcement shall provide certification showing they have passed appropriate AWS qualification tests within the last 12 months.

3.8 CONCRETE SPALL REPAIR – TYPE 1 (LESS THAN 1.5” DEEP)

- A. The existing concrete at the repair area shall be saturated surface dry at the time of repair installation. It may be necessary to wet the repair area with potable water prior to repair material installation. Wetting of the repair area may be required for an extended period of time if the concrete is extremely dry.
- B. Prime the prepared concrete substrate and steel reinforcement with a brush or sprayed applied coat of Sika Armatec 110 EpoCem.

- C. Prime coat shall be allowed the minimum curing time and no more than the maximum curing time as specified by the product manufacturer.
- D. Application of Repair Mortar:
 - 1. Before prime coat dries, apply repair mortar. Scrub material into the substrate, filling all pores and voids. Force material against edge of repair, working toward center. Sections that sag shall be removed and reinstalled.
 - 2. Minimum ambient, surface, and material temperature should be 45°F and rising at the time of application.
 - 3. Do not apply when rain is expected. If unexpected rain occurs, the repair shall either be protected from the rain or removed and replaced during better weather conditions.
- E. Finishing: Steel trowel to provide a smooth surface without ridges or fins. Use a straight edge to maintain a flat surface with a tolerance of 1/16 inch. Finished surface shall be free of trowel marks.
- F. Curing: Cure repaired concrete using the following:
 - 4. The curing period shall be 48 hours with the temperature maintained at or above 45°F by providing a heat source in a tented area when necessary. The ENGINEER may also require shading of the repair area and protection from wind or high temperatures if premature drying is expected to be a problem.
 - 5. The surface of the repair area shall be coated with a water-dissipating curing compound in combination with moist burlap. Curing compound must be compatible with corrosion inhibitor/sealer that will be applied after curing is completed.

3.9 CONCRETE SPALL REPAIR – TYPE 2 (REPAIRS BETWEEN 1.5 AND 8 INCHES DEEP):

- A. The existing concrete at the repair area shall be saturated surface dry (SSD) at the time of repair installation. It may be necessary to wet the repair area with potable water prior to repair material installation. Wetting of the repair area may be required for an extended period of time if the concrete is extremely dry.
- B. All vertical medium depth repairs shall be formed and walers shall be sufficiently rigid to prevent bulging. Forms shall be attached to the existing concrete with expansion anchors. Provide removable upper panels to allow vibrator access.
- C. Priming: Prime the existing concrete and reinforcement with Armatec 110 EpoCem by Sika Corporation. Brush into surface with mason's brush or spray with Goldblatt Pattern pistol. Place fresh concrete within 18 hours of bonding agent application. Where directed by the Engineer, apply a scrub coat of the repair mortar onto the prepared and SSD concrete where Sikacrete 100 CI is used.
- D. Mechanically anchor the repair to the existing concrete by doweling.
 - 6. Doweling: Provide No. 4 L-Bars dowels (ASTM A615 Grade 60) deformed bars at 24 inches on center each way. Grout L-Bars in 1¼-inch diameter holes using a non shrink grout such as SikaGrout 212 or approved equal. Dowel holes shall be rotary drilled on a 15-degree angle normal to the repair surface. Install grout

using a funnel type of device. Twist bars into the grout. Dry pack end of hole. In cold weather, the existing concrete must be heated to 55°F and maintained at that temperature for 24 hours after grout placement. (An acceptable alternate method of installation is with Sika AnchorFix 3001, or approved equal, installed in accordance with manufacturer's instructions.)

- E. Headbox: Provide headboxes or chutes into the top of the form depending on the size of the placement. Remove concrete at headbox and chutes while concrete is green and grind smooth.
- F. Supplemental Reinforcement at Repairs: For repairs deeper than 3 inches provide reinforcing as shown on the drawings.
- G. To ensure good intimate contact and consolidation, scrub the repair concrete into the substrate, or employ a mechanical vibrator with form and pour or pump applications. Pump with a variable pressure pump until a 3 to 5 psi increase in normal line pressure is evident. Form should not deflect. Vents to be capped when steady flow is evident.
- H. Curing: Cure repaired concrete using the following:
 - 7. Curing: The curing period shall be 48 hours with the temperature maintained at or above 45°F by providing a heat source in a tented area if necessary. The ENGINEER may also require shading of the repair area and protection from wind or high temperatures if premature drying is expected to be a problem.
 - 8. The surface of the repair area shall be coated with a water-dissipating curing compound or moist cure using moist burlap. Curing compound must be compatible with corrosion inhibitor/sealer that will be applied after curing is completed.
 - 9. If forming is used, forms shall remain in place a minimum of 48 hours. Upon removal of forms, treat concrete with curing methods noted in step 2 above.

3.10 DEEP CONCRETE REPAIRS (DEEPER THAN 8")

- A. The repair material shall be super-plasticized Portland cement concrete with 3/4 inch aggregate.
- B. The existing concrete at the repair area shall be saturated surface dry at the time of repair installation. It may be necessary to wet the repair area with potable water prior to repair material installation. Wetting of the repair area may be required for an extended period of time if the concrete is extremely dry.
- C. All deep repairs shall be formed and walers shall be sufficiently rigid to prevent bulging. Forms shall be attached to the existing concrete with expansion anchors. Provide removable upper panels to allow vibrator access.
- D. Priming: Prime the existing concrete and reinforcement with Armatec 110 EpoCem by Sika Corporation. Brush into surface with mason's brush or spray with Goldblatt Pattern pistol. Place fresh concrete within 18 hours of bonding agent application.
- E. Mechanical Anchorage of Repair to Existing Concrete: Mechanically anchor the repair to the existing concrete by the following method.

1. Dowels: Provide No. 4 L-Bars dowels (ASTM A615 Grade 60) deformed bars at 24 inches on center each way unless otherwise directed by the ENGINEER. Grout L-Bars in 1-1/4-inch diameter holes using a non-shrink grout such as SikaGrout 212, or approved equal. Dowel holes shall be rotary drilled on a 15-degree slope and be 12 inches deep. Install grout using a funnel type of device. Twist bars into the grout. Dry pack end of hole. In cold weather, the existing concrete must be heated to 55°F and maintained at that temperature for 24 hours after grout placement. (An acceptable alternate method of installation is with Sika AnchorFix 2020, or approved equal, installed in accordance with manufacturer's instructions.)
- F. Headbox: Provide headboxes or chutes into the top of the form depending on the size of the placement. Remove concrete at headbox and chutes while concrete is green and grind smooth.
- G. Supplemental Reinforcement at Repairs: Provide reinforcement as shown on the drawings.
- H. Curing: Cure repair concrete using the following:
 1. Remove forms no sooner than 48 hours from the time of the concrete pour. Upon removal, apply curing compound in accordance with manufacturer's instructions. The curing period shall be 48 hours with the temperature maintained at or above 45°F by providing a heat source in a tented area if necessary. The ENGINEER may also require shading of the repair area and protection from wind or high temperatures if premature drying is expected to be a problem
 2. The surface of the repair area shall be coated with a water-dissipating curing compound in combination with moist burlap. Curing compound must be compatible with corrosion inhibitor/sealer that will be applied after curing is completed.

3.11 CONCRETE SURFACE APPLIED CORROSION INHIBITOR AND SEALER

- A. All new concrete surfaces shall be treated with a corrosion inhibitor/surface sealant to minimize concrete and steel reinforcing deterioration due to weathering, infiltration and absorption of water, etc. Surface applied corrosion inhibitor/sealer shall be applied to all concrete repair areas and shall extend beyond the repair areas to fully treat the surrounding concrete panel being repaired; to the nearest corner or joint; or as directed by the Engineer.
- B. Surface corrosion inhibitor/sealants shall be applied in accordance with manufacturer's requirements following proper curing of concrete repair areas.

3.12 EXPANSION JOINT SEALANT REPAIR (JOINTS UP TO 1.5" WIDTH)

- A. Prior to performing any work on the expansion joint sealant repairs, the CONTRACTOR shall perform a Field Adhesion Test to determine the compatibility of the new sealant with the existing concrete substrate. The test shall meet the requirements of ASTM C-1193 Method A Field-Applied Sealant Joint Hand Pull

Tab. The test shall be performed in accordance with the ASTM method, including but not limited to the following general steps:

1. Remove a minimum 5- foot long section of existing sealant material at a representative expansion joint.
 2. Grind or wire brush the surface to create a clean substrate for proper adhesion.
 3. Apply manufacture's recommended primer material and allow to cure for recommended time.
 4. Install backer rod to proper depth.
 5. Apply new sealant material per manufacturer's requirements and allow to cure the recommended time (e.g. typically 7 days).
 6. Perform pull tests to determine failure mode (i.e. within sealant material or at interface with concrete).
 7. If sealant material fails within itself, the test will be considered successful and work may proceed.
 8. If the failure occurs due to lack of adhesion, repeat test as per above being careful to implement each step per manufacturer's requirements.
 9. If test fails again, more advanced preparation methods, alternate materials, or other modifications may be needed through consultation with the Engineer.
 10. All work shall be performed in accordance with the CONTRACTOR's Work Plan, approved Health and Safety Plan, and related handling and disposal requirements for existing sealant materials that may contain PCB's.
 11. There will be no separate payment for the Field Adhesion Tests. All costs associated with the Field Adhesion Test will be included in the CONTRACTOR's Mobilization pay item.
- B. Remove a minimum 5- foot long section of existing sealant material at a representative expansion joint.
- C. Grind or wire brush the surface to create a clean substrate for proper adhesion.
- D. Apply manufacture's recommended primer material and allow to cure for recommended time.
- E. Install backer rod to proper depth.
- F. Apply new sealant material per manufacturer's requirements and allow to cure the recommended time (e.g. typically 7 days).
- G. Perform pull tests to determine failure mode (i.e. within sealant material or at interface with concrete).
- H. If sealant material fails within itself, the test will be considered successful and work may proceed.
- I. If the failure occurs due to lack of adhesion, repeat test as per above being careful to implement each step per manufacturer's requirements.
- J. If test fails again, more advanced preparation methods, alternate materials, or other modifications may be needed through consultation with the Engineer.

- K. All work shall be performed in accordance with the CONTRACTOR's Work Plan, approved Health and Safety Plan, and related handling and disposal requirements for existing sealant materials that may contain PCB's.
- L. There will be no separate payment for the Field Adhesion Tests. All costs associated with the Field Adhesion Test will be included in the CONTRACTOR's Mobilization pay item.
1. Power tools, including wire brushing and grinding, will be required by the CONTRACTOR to remove sealant and clean existing concrete to allow for a proper adhesion. PREFORMED EXPANSION JOINT SEAL REPAIR (GREATER THAN 1.5" WIDTH)
- M. Prior to ordering any of the preformed joint seal, the CONTRACTOR shall accurately measure the expansion joint widths at approximately 6 foot intervals to determine the size of the preformed material that needs to be utilized. Measurements shall be taken as close as possible to mean ambient temperature, and adjusted for temperature variations as applicable.
- N. The preformed joint seal specified shall be manufactured in specific sizes to accommodate the actual expansion joint widths. Contractor shall provide a submittal that includes the joint measurements along with the proposed preformed joint seal based on manufacturer's recommendations that are to be utilized for the specific joints identified.
- O. Prior to performing any work on the expansion joint sealant repairs, the CONTRACTOR shall perform a field fit and adhesion test to determine the compatibility of the preformed seal adhesives with the existing concrete substrate. The test shall meet the manufacturer's requirements and in accordance with any applicable ASTM test methods.
- P. Work shall not proceed until tests are completed and results acceptable to Engineer have been achieved.
- Q. Installation shall be per manufacturer's instructions. The following is a general overview of the steps required to install the preformed seal. Refer to manufacturer's installation requirements for specific details:
1. Clean substrate with a power wire brush or angle grinder to remove contaminants and old sealant, and to produce a uniform surface upon which to install the preformed seal and its adhesive
 2. Prepare concrete surface by making any minor concrete repairs necessary to provide a smooth and uniform surface.
 3. Store seal material at temperatures to allow for controlled expansion
 4. Ensure nominal size of material matches joint size as adjusted for mean temperature variations if applicable.
 5. Mask sides of joint with adhesive tape to prevent adhesive from extending beyond expansion joint faces.
 6. Apply epoxy adhesive or equivalent adhesive system to concrete substrate within expansion joint

7. Insert pre-compressed joint seal material into expansion joint, and allow material to fully expand for snug fit.
8. For additional lengths of joint seal, apply thin bead of silicone sealant along edge of bellows at end where the material will join with next length.
9. Insert material into joint with appropriately 1/4-inch (6mm) recess and
10. adhere to one joint face. Allow material to expand against other
11. joint face. (Wedge larger-sizes in place while it expands.)
12. Apply preformed transition and end pieces to conform to floodwall chamfered sections and corners where needed.
13. Once material has equalized its expansion across the joint, apply silicon bead using caulking gun, and tool fillet bead at the substrate to-bellows interface.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Before beginning concrete repairs, ENGINEER to review concrete conditions with CONTRACTOR to determine repair locations. Repair of locations not approved by ENGINEER will be not measured for payment.
- B. Measurement for CONCRETE SURFACE CLEANING (PRESSURE WASH CLEANING) shall be made by the Contract Price Lump Sum and shall be measured once only for this Contract.
- C. Measurement for CRACK REPAIR – TYPE 1 shall be based on linear foot of crack repair.
- D. Measurement for CRACK REPAIR – TYPE 2 shall be based on linear foot of crack repair.
- E. Measurement for CRACK REPAIR – TYPE 3 shall be based on linear foot of crack repair.
- F. Measurement for CRACK REPAIR – TYPE 4 shall be based on linear foot of crack repair.
- G. Measurement for JOINT SEALANT REPAIR shall be based on linear foot of joint sealant installed.
- H. Measurement for SPALL REPAIR – TYPE 1 shall be based on square foot of repair performed.
- I. Measurement for SPALL REPAIR – TYPE 2 shall be based on square foot of repair performed.
- J. Measurement for DEEP CONCRETE REPAIRS shall be based on cubic foot of repairs performed before placing concrete.
- K. Concrete repairs that are defective or otherwise non-conformant with the Contract Documents will not be measured for payment.

- L. All other items described in this section are considered incidental to this work, and will not be measured for payment.

4.2 METHOD OF PAYMENT

- A. Payment for CONCRETE SURFACE CLEANING (PRESSURE WASH CLEANING) shall be by the Contract Price Lump Sum for the cleaning of the concrete stair and ramp structure as such within the Contract Documents. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this section.
- B. Payment for CRACK REPAIR – TYPE 1 shall be a unit price per linear foot repaired in plan view (horizontal surfaces) or profile view (vertical surfaces). This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this section.
- C. Payment for CRACK REPAIR – TYPE 2 shall be a unit price per linear foot repaired in plan view (horizontal surfaces) or profile view (vertical surfaces). This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this section.
- D. Payment for CRACK REPAIR – TYPE 3 shall be a unit price per linear foot repaired in plan view (horizontal surfaces) or profile view (vertical surfaces). This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this section.
- E. Payment for CRACK REPAIR – TYPE 4 shall be a unit price per linear foot repaired in plan view (horizontal surfaces) or profile view (vertical surfaces). This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this section.
- F. Payment for JOINT SEALANT REPAIR shall be a unit price per linear foot installed in plan view (horizontal surfaces) or profile view (vertical surfaces). This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this section.
- G. Payment for SPALL REPAIR – TYPE 1 shall be a unit price per square foot repaired in plan view (horizontal surfaces) or profile view (vertical surfaces). This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this section.

- H. Payment for SPALL REPAIR – TYPE 2 shall be a unit price per square foot repaired in plan view (horizontal surfaces) or profile view (vertical surfaces). This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this section.
- I. Payment for DEEP CONCRETE REPAIRS shall be a unit price per cubic foot in place and accepted. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this section.

PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
030100-1	Concrete Surface Cleaning (Pressure Wash Cleaning)	LS
030100-2	Crack Repair – Type 1	LF
030100-3	Crack Repair – Type 2	LF
030100-4	Crack Repair – Type 3	LF
030100-5	Crack Repair – Type 4	LF
030100-6	Joint Sealant Repair	LF
030100-7	Spall Repair – Type 1	SF
030100-8	Spall Repair – Type 2	SF
030100-9	Deep Concrete Repairs	CF

*** END OF SECTION ***

**SECTION 03 31 30
REINFORCED CONCRETE**

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.2 SCOPE OF WORK

- A. Work under this Section, without limiting the generality thereof, consists of the furnishing and installation of all materials, equipment, labor, testing, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:
1. Pier
 - (a) Concrete pile caps
 - (b) Concrete deck
 - (c) Pier abutment
 2. Miscellaneous reinforced concrete items including, but not limited to:
 - (a) Gangway abutment
 - (b) Drainage headwall
 - (c) Debris boom anchor block
 - (d) As otherwise shown on contract documents or needed to complete the work
- B. Should drawings not agree within themselves or the specifications, the greater quantity, or superior quality of work or materials shall be included.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
1. Demolition under DEMOLITION, SECTION 02 41 00
 2. Metal fabrications under MISCELLANEOUS METALS, SECTION 05 50 13
 3. Earthwork under EARTHWORK, SECTION 31 00 00

1.4 QUALITY ASSURANCE

- A. Except as noted, work shall conform to the latest edition of the following code specifications and standards:
1. American Society for Testing and Materials (ASTM)
 2. American Concrete Institute (ACI):
 - (a) "Building Code Requirements for Reinforced Concrete", ACI 318.
 - (b) "Specifications for Structural Concrete for Buildings", ACI 301.
 - (c) "Recommended Practice for Measuring, Mixing, and Placing Concrete", ACI 304.
 - (d) "Recommended Practice for Cold (Hot) Weather Concreting", ACI 305 and ACI 306.

- (e) "Guide to Formwork for Concrete", ACI 347.
- 3. Concrete Reinforcing Steel Institute (CRSI):
 - (a) Design of Reinforced Concrete Structures - "A Manual of Standard Practice".
 - (b) "Placing Reinforcing Bars".
- 4. The State of Connecticut, Department of Public Works "Standard Specifications for Highways and Bridges" (ConnDOT)

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. Reinforcing steel shop drawings:
 - (a) Shall be of such detail and completeness that all fabrication and placement at the site can be accomplished without the use of Contract Drawings for reference.
 - (b) Shall include number of pieces, sizes, and grade of reinforcing steel, accessories, and any other information required for fabrication and placement.
 - (c) Shall show joint layout and design
 - 2. Contractor shall check structural and site drawings for anchor bolts, anchors, inserts, conduits, sleeves, and any other items which are required to be embedded in concrete and shall make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.
- B. Concrete mix designs for each type of work, each supplier and as specified in this Section
- C. Concrete break history on the mix design for no less than 2 years of history
- D. Concrete repair mortar/manufacturer/design mix
- E. Name and address of Independent Testing Laboratory in conformance with ASTM E329 for approval by Engineer
- F. Cold weather concrete protection and curing details in conformance with ACI 305R
- G. Hot weather concrete protection and curing details in conformance with ACR 306R
- H. Concrete wind protection and curing details

1.6 TESTING OF CONCRETE

- A. Quality Control:
 - 1. Test Specimens: The Contractor will be required to make, cure, and have tested a minimum of one set of five test specimens from the concrete of each day's pour and for each fifty cubic yards of concrete cast in accordance with ASTM Designations C172, C31, and C39. Two cylinders shall be broken after seven days and two cylinders after twenty-eight days. The fifth cylinder shall be stored on the site to the same conditions of the ongoing work as reserve to break if and when the placed concrete does not achieve the required strength at 28 days.
 - 2. Slump: A slump test shall be made for each truckload of concrete in accordance with ASTM Designation C143. Slumps greater than design mix limit will be grounds for rejection of the concrete.

3. Air Content: The Contractor shall make an air content test from each day's pour of concrete by the pressure method in accordance with ASTM Designation C231. Air contents above or below the limits specified will be grounds for rejection of the concrete.
4. Testing: All personnel and laboratories testing concrete shall be licensed by the State of Connecticut.
5. Test Failures: In the event the compressive strength of the cylinders, when tested, is below the specified minimum, the Engineer may require test cores of the hardened structure to be taken by the Testing Laboratory in accordance with ASTM C-42. If such test indicates that the core specimen is below the required strength, the concrete in question shall be removed and replaced without cost to The Owner. Any other work damaged because of this concrete removal shall be replaced with new materials to the satisfaction of the Engineer at no additional cost to The Owner. The cost of coring will be deducted from the Contract amount. Where core cylinders have been taken by the Testing Laboratory and the concrete proves to be satisfactory, core holes shall be filled in a manner satisfactory to the Engineer at no additional cost to The Owner.

- B. The Contractor shall coordinate the date and location of tests with the Engineer before any concrete work is started.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Reinforcing steel shall be transported to the site, stored, and covered in a manner which will ensure that no damage shall occur to it from moisture, dirt, grease, or any other cause that might impair bond to concrete or chip coating. A sufficient supply of approved reinforcing steel shall be stored on site at all times to ensure that there will be no delay of work. Identification of steel shall be maintained after bundles are broken.

PART 2 PRODUCTS

2.1 MATERIALS

- A. The following materials shall be used unless specifications define elsewhere with a specific construction element.
- B. Portland Cement: ASTM C 150, Type II or V of U.S. manufacture. Only one brand of cement shall be used on the project.
- C. Aggregates:
 1. Fine aggregate. ASTM C 33, clean and graded from 1/4 inch to fines.
 2. Coarse aggregate. ASTM C 33, clean and graded from 1/4 inch to maximum sizes hereinafter specified.
- D. All admixtures shall all be from the same manufacturer.
- E. Air Entraining Agent: Conforming to ASTM C 260 for Air-Entraining Admixtures for Concrete.
- F. Water Reducing Agent: Conforming to ASTM C 494 Type A for Chemical Admixtures for Concrete.

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- G. Anti-Shrinkage Agent: Conforming to ASTM C 494/C 494M
 - H. Microsilica Admixture (if required): Packaged in easily dispersing form.
 - I. All chemical admixtures shall be by the same manufacturer.
 - J. Water: Clean and potable, free of impurities detrimental to concrete.
 - K. Reinforcing Bars: New, deformed billet steel bars conforming to ASTM A 615, Grade 60, hot dip galvanized after fabrication in accordance with ASTM A767 Class 1 or continuous galvanized in accordance with ASTM A 1094. Bend diameters shall comply with ASTM A767 for steel produced to that standard.
 - L. Accessories: Reinforcement accessories, consisting of spacers, chairs, ties, and similar items shall be provided as required for spacing, assembling, and supporting reinforcement in place. All accessories shall be dielectric coated steel or approved plastic accessories, conforming to the applicable requirements of the CRSI Standards herein before specified.
 - M. Mechanical splices shall meet or exceed ASTM A615 and be hot dipped galvanized.
 - N. Tie wire for reinforcement shall be 16 gauge or heavier dielectric coated steel or approved plastic accessories, conforming to the applicable requirements of ASTM A-82.
 - O. Form Ties and Spreaders: Standard metal form clamp assemble and plastic cone, of type acting as spreaders and leaving no metal within 1 inch of concrete face. Inner tie rod shall be left in concrete when forms are removed. No wire ties or wood spreaders will be permitted. Use 1/2" x 1" C.T. plastic cones for sinkages.
 - P. Form Coatings: Non-grain raising and non-staining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface. Coating containing mineral oils or the nondrying ingredients will not be permitted.
 - Q. Concrete Repair Mortar: A fast setting, high-strength, non-shrink repair mortar with saltwater resistance suitable for overhead and vertical repairs, such as SikaRepair SHA with Sika Latex R, Five Star EZ-Cure Repair Mortar, Prospec Vertical Leveling Mortar, or approved equal. Surfaces shall be prepared and Concrete Repair Mortar shall be mixed and applied in accordance with the manufacturer's recommendations.
 - R. Bonding agents suitable for concrete and grout. Agent shall be resistant to saltwater environment such as SIKA Armatec 110, EUCO #452 epoxy system or approved equal.
 - S. Bond Breaker:
 - 1. Tape for Joints: Adhesive-backed glazed butyl or polyethylene tape. Same width as joint that will adhere to premolded joint material or concrete surface.
 - 2. Nonstaining type, providing positive bond prevention
 - T. Premolded Joint Filler:
 - 1. Bituminous Type: ASTM D994 or ASTM D1751.
 - 2. Sponge Rubber:

3. Neoprene, closed-cell, expanded; ASTM D1056, Type 2C5, with compression deflection, 25 percent deflection (limits), 119 kPa to 168 kPa (17 psi to 24 psi) minimum. Use in joints for potable and non-potable water containment structures.

U. Pourable Joint Fillers:

1. General: Although product is a sealant, it is being specified as a filler to prevent debris accumulation and allow expansion and contraction under shrinkage and thermal loads. It does not need to meet proportional sealant geometry requirements.
2. Filler for potable or non-potable water containment structures:
3. Multicomponent sealant, self-leveling or nonsag as required for level, sloping, or vertical joints.
4. Color: White.

V. Steel Expansion Joint Dowels:

1. Dowels: Dowels shall be round smooth stainless steel bars Series 300, Type 304.

2.2 CONCRETE STRENGTHS AND PROPORTIONS

- A. Cast-in-place concrete shall have the following minimum compressive strength at 28 days and shall be proportioned within the following limits:

Class	Minimum Strength at 28 days	Maximum Size of Aggregate	Water Cement Ratio	Minimum Cementitious Material Content	Maximum Cement Replacement	Air Entrainment (air content)
A	5000 psi	¾"	0.40	660 lbs./CY	Per ACI 318 Except Max slag 25%	5 to 7%

- B. Air-Entrainment: The air content in all concrete shall be maintained as defined above.
- C. Slump: The slump in 5000psi concrete shall be between 3 inches to 5 inches and in accordance with ASTM C 143.
- D. The proportions of aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate or excess free water to collect on the surface.
- E. Concrete mix design by supplier shall have been in satisfactory use for a minimum of 2 years.

PART 3 EXECUTION

3.1 CAST-IN-PLACE CONCRETE GENERAL

A. Falsework for Forms:

1. The Contractor shall build and maintain necessary falsework for the forms.

B. Construction of Forms:

1. Forms shall be constructed of sound material, of the correct shape and dimensions, mortar tight, of sufficient strength, and so braced and tied together that the movement of men, equipment, materials, or placing and vibrating the concrete will not throw them out of line or position. Cold joint forms shall have a roughened profile for adjacent pours.
 2. During pumping, forms shall be inspected to guarantee that no leaks are present and Contractor shall ensure that concrete, when cured, will result in a composition as specified herein.
 3. Embedded Items:
 - (a) Provisions shall be made for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, waterstops, and other features. No wood other than necessary nailing blocks shall be embedded in concrete. Complete cooperation shall be extended to suppliers of embedded items in their installation. Secure information for embedded items from other trades as required. All embedded items shall be securely anchored in correct location and alignment prior to placing concrete.
 4. Openings for Items Passing Through Concrete:
 - (a) Contractor shall establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections. Contractor shall be held responsible for proper coordination of all work of this nature in order that there will be no unnecessary cutting and patching of concrete. Any cutting and repairing to concrete, required because of failure to provide for such openings, shall be paid for by the Contractor at no additional expense to The Owner.
- C. Removing Forms and Falsework:
1. Wood forms shall not be removed for at least 48 hours after concrete has been placed.
 2. Forms shall not be removed until the concrete has attained sufficient strength to ensure stability, specifically pile caps and pier deck.
- D. Reinforcing Steel:
1. Reinforcing Steel: Shall be placed in accordance with the drawings and approved shop drawings and the applicable requirements of the "Codes and Standards" herein before specified. Install reinforcement accurately and secured against movement, particularly under the weight of workmen and the placement of concrete.
 2. Reinforcing Steel Supports: Bars shall be supported on approved plastic or dielectric-coated metal chairs or spacers, accurately placed, and securely fastened to forms or steel reinforcement in place. Additional bars shall be supplied, whether specifically shown on the drawings or not, where necessary to securely fasten reinforcement in place. Support legs of accessories in forms without embedding in form surface. Spacing of chairs and accessories shall conform with CRSI's "Recommended Practice for Placing Bar Support". Hooping and stirrups shall be accurately spaced and wired to the reinforcement. No wood will be permitted inside forms. Lifting of welded wire fabric into proper position while concrete is being poured, rather than supporting fabric on chairs, will not be permitted.
 3. Placing and Tying: All reinforcement shall be set in place, spaced, and rigidly and securely tied or wired with tie wire at all splices and at all crossing points and intersections in the positions shown, or as directed. Rebending of bars on the job to accommodate existing conditions will not be permitted without the written approval of the Engineer. Point ends of wire ties away from forms.
 4. Spacing: Minimum center to center distance between parallel bars shall be in accordance with the details on the drawings, or, where not shown, the clear spacing shall be 2 times

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- the bar diameter, but in no case less than 1-1/2 inches or 1-1/2 times the maximum sized aggregate.
5. Minimum edge distance of 3" unless otherwise noted on the Contract Drawings.
 6. Splices shall be in accordance with the following:
 - (a) Lap Splicing:
 - (i) Maximum 50% of steel spliced occurring within lap length.
 - (ii) Top bars shall be 1.4 times values given below.
 - (iii) Splice lengths - #6 bars and smaller 40 bar diameters
 - (iv) Splice lengths - #7 bars and greater 47 bar diameters
 7. Protective Concrete Covering: Except where shown otherwise on drawings, the minimum concrete coverage for steel reinforcement shall conform with the applicable revisions of the "Codes and Standards" herein before specified.
 8. Reinforcement Around Openings: On each side and above and below pipe or opening, place an equivalent area of steel bars to replace steel bars cut for opening. Extend steel reinforcing a standard lap length beyond opening at each end.
 9. Bar Cutting: Reinforcement bars shall not be cut in the field, unless permitted by Engineer.
 10. Welding: Welding of reinforcement is not permitted. Coating damaged incurred during shipment, handling and placing of zinc-coated (galvanized) reinforcing bars must be repaired in accordance with ASTM A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings. Damaged areas must not exceed 2 percent of the surface area in each linear foot of each bar or bar must not be used.
- E. Mixing of Concrete:
1. All concrete shall be ready-mixed concrete and shall be mixed and delivered in accordance with the "Specification for Ready-Mixed Concrete", ASTM C-94. The batch plant of the concrete producer shall be certified for compliance with the standards established by the National Ready-Mixed Concrete Association.
 2. In the event concrete is mixed at a central batching plant, the delivery shall be arranged so that intervals between batches are kept to a minimum, and in any event, not more than thirty (30) minutes. Trucks shall be in first class condition and kept in constant rotation during delivery.
 3. Concrete shall be placed within 90 minutes after cement has been mixed with aggregate or 45 minutes after addition of water and admixtures.
 4. No admixtures, except those mentioned in paragraph 2.1 shall be used. Calcium chloride will not be permitted.
 5. Truck delivery slips of all concrete delivered to the job shall be presented to the Engineer and shall indicate the quantity and quality of concrete, additives, date and time of batching and delivery, and the location of placement. No concrete shall be placed until the Engineer has reviewed and approved the delivery slip for that placement.
- F. Cold Weather Requirements:
1. Concrete shall not be mixed or placed when the temperature is below 40 degrees F., or when conditions indicate that the temperature will fall below 40 degrees F. within 72 hours unless precautions are taken to protect the concrete.
 2. Concrete temperature shall be maintained, when deposited, at not less than 60 degrees F. Reinforcement, forms, and ground which concrete will contact must be completely free of frost.
 3. Concrete and formwork must be kept at a temperature of not less than 50 degrees F. for not less than 96 hours after placing.

4. Calcium chloride shall not be used.
 5. Contractor shall provide heating and/or insulation to formwork as required to comply with these minimum temperature requirements.
- G. Hot Weather Requirements:
1. The maximum temperature of the concrete, when deposited, shall be 85 degrees F. If the weather causes the placing temperature to exceed 85 degrees F., the mix shall be cooled by appropriate methods, if approved by the Engineer.
 2. No concrete shall be deposited when the air temperature is greater than 90 degrees F.
- H. Conveying and Placing Concrete:
1. Notification: Contractor shall notify Owner's Representative at least 48 hours in advance of any placement of concrete.
 2. Form Preparation: Before placing concrete, forms shall be thoroughly inspected. All chips, dirt, etc., shall be removed, all temporary bracing and cleats taken out, all openings for pipes, etc., properly boxed, all forms properly secured in their correct position and made tight, all reinforcement, anchors, and embedded items secured in their proper places. Concrete which may be on the forms or reinforcement, and which is set and dry, shall be cleaned off, and the forms and steel washed off before proceeding. Remove all foreign matter from forms and excavations.
 3. Excess Water: Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer. Any flow of water into an excavation shall be diverted through proper side drains into a sump or shall be removed by other approved methods which will avoid washing away the freshly deposited concrete.
 4. Soil on which concrete will be poured shall be thoroughly wetted (except in freezing weather).
 5. Existing Concrete Preparation: All existing concrete that is to have fresh concrete placed against shall be surfaced roughened to a minimum of ¼" amplitude within 2 inches of the edges and shall be coated with approved bonding agent.
 6. Anchors and Embedded Items: Anchors, bolts, sleeves, inserts, wood blocking, and any other items to be embedded in concrete shall be accurately secured in position before the concrete is placed. Aluminum shall not be embedded in concrete.
 7. Handling and Depositing of Concrete:
 - (a) Before any concrete is placed, the Contractor shall notify all whose work is in any way connected with or influenced by the concrete work and give them reasonable time to complete all portions of their work that must be completed before concrete is deposited.
 - (b) Immediately before concrete is placed, the Contractor shall inspect all forms to be sure that they are in proper position, sufficiently rigid, thoroughly clean, properly oiled and free from foreign materials and that all reinforcement is in proper position.
 - (c) Concreting, once started, shall be carried on as a continuous operation until the section of approved size and shape is completed. Cold joints will not be accepted.
 - (d) Concrete shall be conveyed as rapidly as practicable from the mixer to the place of final deposit by methods, which prevent the separation or loss of ingredients. It shall be deposited, as nearly as practicable, in its final position to avoid rehandling or flowing.
 - (e) Concrete shall not be dropped freely where reinforcement will cause segregation, nor shall it be dropped freely more than six (6) feet. Concrete shall be deposited to maintain a plastic surface approximately horizontal.

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- (f) Concrete that has partially hardened shall not be deposited in the work.
8. Pumping:
- (a) Concrete may be placed by pumping if first approved in writing by the Engineer for the location proposed.
 - (b) Equipment for pumping shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of materials.
 - (c) The concrete mix shall be designed to the same requirements as herein before specified and may be richer in lubricating components to allow proper pumping.
 - (d) Concrete shall not be pumped through aluminum pipes.
 - (e) All pumping operations must have full-time inspection by a recognized testing laboratory approved by the Engineer and paid for by the Contractor. The cost of this full-time inspection shall be included in the Contractor's bid proposal if the option of pumping is elected.
9. Vibrating and Compacting:
- (a) All concrete shall be thoroughly consolidated and compacted by suitable means during the operation of placing, and shall be thoroughly worked around reinforcement, embedded items, and into the corners of the forms. All concrete against forms shall be thoroughly spaded. Internal vibrators shall be used under experienced supervision and shall be kept out of contact with reinforcement and wood forms. Vibrators shall not be used in a manner that forces mortar between individual form members.
 - (b) Vibrators shall be flexible electric type or approved compressed air type, adequately powered and capable of transmitting to the concrete not less than seven thousand (7,000) impulses per minute. Vibration shall be sufficiently intense to cause the concrete to flow or settle readily into place without separation of the ingredients. A sufficient number of vibrators shall be employed so that complete compaction is secured throughout the entire volume of each layer of concrete. At least one (1) vibrator shall be kept in readiness as a spare for emergency use. Vibrators shall be such that the concrete becomes uniformly plastic with their use.
 - (c) Vibration shall be close to the forms but shall not be continued at one spot to the extent that large areas of grout are formed or the heavier aggregates are caused to settle. Care shall be taken not disturb concrete which has its initial set. Vibrations shall not be used to walk concrete from one side to another within given form. Walking concrete will cause separation of the mix.
 - (d) Where conditions make compacting difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement to sand as used in the concrete shall first be deposited in the forms, to a depth of at least on inch.
 - (e) The responsibility for providing fully filled out, smooth, clean, and properly aligned surfaces free from objectionable pockets shall rest entirely with the Contractor.
- I. Construction Joints:
- 1. Construction joints shall be located as shown on the Contract Drawings or where approved in joint location submittal. If, for any reason, the Contractor feels a change is necessary, he shall prepare a placing plan and submit it to the Engineer for approval. Where a joint is to be made, the surface of the concrete shall be sandblasted or thoroughly picked, thoroughly cleaned, and all laitance removed. In addition to the foregoing, joints shall be thoroughly wetted, but not saturated, and slushed with a thin coat of grout immediately before the placing of new concrete. Approved keys shall be used at all joints, unless detailed

otherwise. Forms shall be retightened before placing of concrete is continued. There shall be an interval of at least 48 hours between adjacent pours.

J. Expansion Joints:

1. Expansion joints shall be located as shown on Contract Drawings. Unless otherwise designed the joint shall include a joint filler, a bond breaker, and joint sealant, and be installed as indicated on Contract Drawings.
2. Surface Preparation:
 - (a) Use wire brush or motorized device to mechanically roughen and thoroughly clean concrete surfaces on each side of joint from plastic waterstop to top of joint.
 - (b) Use dry, high-pressure air to remove dust and foreign material, and dry joint.
 - (c) Prime surfaces as required before placing joint filler.
 - (d) Avoid damage to waterstop.
3. Installation:
 - (a) Premolded Joint Filler:
 - (i) Sufficient in width to completely fill joint space where shown.
 - (ii) Install per manufacturer's written instructions.
 - (iii) If waterstop is in joint, cut premolded joint filler to butt tightly against waterstop and concrete face.
 - (iv) Precut premolded joint filler to required depth at locations where joint filler or sealant is to be applied.
 - (v) Form cavities for joint filler with either precut, premolded joint filler, or smooth removable accurately shaped material. Entire joint above waterstop, in slabs, shall be formed and removed so that entire space down to waterstop can be filled with the pourable joint filler.
 - (vi) Vibrate concrete thoroughly along joint form to produce dense, smooth surface.
 - (b) Bituminous Type Premolded Joint Filler:
 - (i) Drive nails approximately 1 foot 6 inches on center through filler, prior to installing, to provide anchorage embedment into concrete during concrete placement.
 - (ii) Secure premolded joint filler in forms before concrete is placed.
 - (iii) Sponge Rubber Joint Filler: Install per manufacturer's written instructions.
 - (c) Pourable Joint Filler:
 - (i) Install in accordance with the manufacturer's written instructions, except as specified below:
 - (ii) Apply primer prior to pouring joint filler.
 - (iii) Fill entire joint above the waterstop with joint filler as shown.
 - (iv) Use masking tape on top of slabs at sides of joints; clean spillage. Remove masking tape afterwards.
 - (v) Sealant products used as fillers need not meet sealant geometry parameters. Do not use backing rods.
 - (d) Steel Expansion Joint Dowels:
 - (i) Install coated and lubricated bars parallel to wall or slab surface and in true horizontal position perpendicular to joint in both plan and section view, so as to permit joint to expand or contract without bending dowels.
 - (ii) Secure dowels tightly in forms with rigid ties.
 - (iii) Install steel reinforcement in concrete as shown.

K. Patching:

1. Immediately after stripping forms, patch minor defects, form-tie holes, honeycombed areas, etc., before concrete is thoroughly dry. Repair gravel pockets by cutting out to solid surface, form key, and thoroughly wet before placing patching mortar consisting of 1 part cement to 2 parts fine sand; compact into place and neatly finish. Honeycombed areas or gravel pockets which, in the Engineer's opinion are too large and unsatisfactory for mortar patching as described above, shall be cut out to solid surface, keyed, and packed solid with matching concrete to produce firm bond and surface.
2. The Contractor shall do the entire cutting as required by himself or other trades. All such work shall be of the minimum size required. No excessive cutting will be permitted; nor shall any structural members or reinforcement be cut.
3. The Contractor shall do all patching after work by other trades has been installed, where required, using Portland Cement Mortar 1:2 sand mix.

L. Protection and Curing:

1. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
2. Protect fresh concrete from drying winds, rain, damage, or spoiling. Curing paper shall be lapped 4 inches minimum at joints and sealed with waterproof tape.
3. Keep concrete in a thoroughly moist condition from the time it is placed until it has cured, for at least seven (7) days.
4. Carefully protect exposed concrete corners from damage.
5. Allow no slabs to become dry at any time until curing operations are complete. In general, slabs shall be cured with non-staining curing paper, hosing or fog spray; vertical surfaces shall be cured with wetted Burlene or fog spray unless otherwise approved.

M. Concrete Finishes:

1. Unexposed Surfaces: All unexposed surfaces shall have form finish at the Contractor's option.
2. Wearing Surface Finish
 - (a) The wear surface shall receive a monolithic steel trowel finish. Surfaces shall be finished with a screed, float, or steel trowel. Trowel shall be vigorously used at an angle under pressure by the finisher until troweling gives evidence of shine or gloss as required to make a smooth, hard, dense, impervious surface, free of defects. Finishers shall work from kneeboards laid flat upon the surface. Mechanical troweling machines may be used if the desired finish and level tolerances can be obtained by their use, but finishing shall be by hand troweling.
 - (b) Where directed, finish surfaces by scoring in parallel lines with a fine hair stable broom, perpendicular to the direction of traffic or as indicated on the drawings.
3. Exposed Surfaces:
 - (a) Surfaces exposed to view shall be finished. Within 48 hours after the forms have been removed and form ties cut back from the face of the concrete, all voids and cavities shall be filled with a stiff mortar of the same composition and air-entrainment as the mortar in the original concrete mix. The same brand and color of cement, and the same kind and color of aggregate as was used in the original concrete mix shall be used in this mortar. The mortar for filling shall have been mixed and let set for 30 minutes and then remixed before placing in the work. The surface film of all such pointed surfaces shall be carefully removed before setting of the mortar occurs.

- (b) If the Engineer determines these surfaces as prepared do not present a uniformly smooth, clean surface of even texture and appearance, the surface shall be treated and rubbed to obtain a satisfactory finish. The Engineer shall be the sole judge of the amount of rubbing which will be required.
 - (c) If rubbing is required, the rubbing will start within 48 hours of notification that the rubbing is required; the surface should be wetted with clean water and rubbed with a No. 16 carborundum brick or other abrasive of equal quality until even and smooth and of uniform appearance, without applying any cement or other coating. If additional finishing is necessary, it shall be obtained by a thorough rubbing with a No. 10 carborundum brick or other abrasive of equal quality. Subject to approval by the Engineer, rubbing may be performed by use of satisfactory power equipment and tools, providing the operational procedures shall be the same as those outlined above for hand rubbing.
 - (d) Rubbing will be kept to the minimum found necessary to produce smooth, even surfaces of uniform appearance. Rubbing will not be required to fill very small surface air bubble holes.
 - (e) Patches required for form ties, if carefully and properly done, may not necessitate rubbing. However, if the work is done in such a way that the patches are conspicuous; the entire exposed face on which they occur shall be rubbed.
 - (f) After the final rubbing is completed, and the mortar has set up, the surface shall be thoroughly drenched and kept wet with clean water for a period of five days, unless otherwise directed.
 - (g) No rubbing will be permitted when the air temperature is below 40 °F.
 - (h) Any formed surfaces not exposed to view, including the underside of concrete decking, shall be finished. Immediately after forms have been removed and form ties cut back from the face of the concrete, all voids and cavities shall be fixed with a stiff mortar of the same composition and air-entrainment as the mortar in the original concrete mix. The mortar for filling shall have been mixed and let set for 30 minutes and then remixed before placing in the work. In case the operation of filling is delayed, the surface of the concrete shall be thoroughly cleaned and washed with water, if necessary, before the mortar is applied.
4. Addition of Material:
- (a) The addition of cement, sand, water, or mortar to any surface while finishing concrete is strictly prohibited.

N. Backfill Against Structures:

- 1. Do not backfill against walls until concrete has obtained specified 28-day compressive strength.
- 2. Unless otherwise permitted, place backfill simultaneously on both sides of structure, where such fill is required, to prevent differential pressures.

O. Defective Work:

- 1. The following concrete work shall be considered defective and may be ordered by the Engineer to be removed and replaced at Contractor's expense:
 - (a) Incorrectly formed.
 - (b) Not plumb or level.
 - (c) Not specified strength.
 - (d) Containing rock pockets, voids, honeycomb, or cold joints.
 - (e) Containing wood or foreign matter.

(f) Otherwise not in accordance with the intent of the Drawings and Specifications.

P. Concrete Repair:

1. Inject cracks that leak with crack repair epoxy.
2. Repair defective areas of concrete.
3. Repair concrete surfaces using specified materials. Select system, submit for review, and obtain approval from Engineer prior to use.
4. Develop repair techniques with material manufacturer on surface that will not be visible in final construction prior to starting actual repair work. Obtain approval from Engineer.
5. Obtain quantities of repair material and manufacturer's detailed instructions for use to provide repair with finish to match adjacent surface or apply sufficient repair material adjacent to repair to blend finish appearance.
6. Repair of concrete shall provide structurally sound surface finish, uniform in appearance or upgrade finish by other means until acceptable to Engineer.

Q. Remove metal objects not intended to be exposed in as-built condition of structure including wire, nails, and bolts, by chipping back concrete to depth of 1 inch and then cutting or removing metal object.

PART 4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

A. Method of Measurement

1. Measurement of CONCRETE PIER shall be measured by Lump Sum.
2. Measurement of ABUTMENTS, HEADWALL, DEBRIS BOOM ANCHOR BLOCK & MISC. CONCRETE shall be measured by Lump Sum. Volume shall be computed using the dimensions shown on the Contract Drawings. No additional volume will be included without prior direction and authorization by the Engineer.
3. For all other concrete work, no separate measurement or payment will be made for the work in this Section. Measurement and Payment for these items shall be included within the work it is associated with.

B. Method of Payment

1. Payment shall be made for CONCRETE PIER at the Contract Unit Price Lump Sum, complete in place. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, survey, and supervision for the satisfactory supply and installation of new concrete pier pile caps and decking including, but not limited to, compaction, falsework, temporary supports, forming, finishing, dowels, reinforcing steel, mortars, epoxy adhesives, inserts, anchors, steel plates, surface preparation, curing, attachments, disposal items not otherwise indicated for separate payment and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.
2. Payment shall be made for ABUTMENTS, HEADWALL, DEBRIS BOOM ANCHOR BLOCK & MISC. CONCRETE at the Contract Unit Price LUMP SUM, complete in place. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, survey, and supervision for the satisfactory supply and installation of new concrete abutments and headwall including, but not limited

to, compaction, falsework, temporary supports, lifting, forming, finishing, dowels, reinforcing steel, mortars, grouts, epoxy adhesives, inserts, anchors, steel plates, surface preparation, curing, attachments, disposal items not otherwise indicated for separate payment and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.

C. Payment Items

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
03 31 30-01	Concrete Pier	LS
03 31 30-02	Abutments, Headwall, Debris Boom Anchor Block & Misc. Concrete	LS

*** END OF SECTION ***

**SECTION 05 50 00
METAL FABRICATIONS**

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.2 SCOPE OF WORK

- A. Work under this Section, without limiting the generality thereof, consists of manufacturing or shop-fabricating metal elements itemized below and installation of all materials, equipment, labor, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:
 - 1. Guardrails
 - 2. Miscellaneous fabricated elements not otherwise identified
- B. Should drawings not agree within themselves or the specifications, the greater quantity, or superior quality of work or materials shall be included.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications.
 - 1. Concrete under REINFORCED CONCRETE, SECTION 03 31 30
 - 2. Metals under MISCELLANEOUS METALS, SECTION 05 50 13

1.4 QUALITY ASSURANCE

- A. Except as noted, work shall conform to the following codes and standards:
 - 1. American Society for Testing and Materials (ASTM), latest edition.
 - 2. American Institute of Steel Construction (AISC) Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings, latest editions.
 - 3. American Welding Society (AWS).

1.5 SUBMITTALS

- A. Submit for approval prior to fabrication all information necessary for the fabrication of the component parts. Indicate size and weight of members, type and location of shop and field connections, and the type, size, and extent of all welds, and welding sequences. Use American Welding Society welding symbols. Approval of shop drawings will be for size and arrangement of principal and auxiliary members and strength of connections. Any errors in dimensions shown on shop drawing shall be the responsibility of the Contractor.
- B. The Contractor shall use only certified welders and the shielded arc process for all welding performed in connection with the work of this Section. Each welder shall be certified for the particular work, prior to commencing the work which must be accomplished.

- C. Upon completion of this portion of the work, and as a condition of its acceptance, the Contractor shall deliver to the Engineer a letter signed by an official of the metal fabricating firm or firms certifying that all fabricated metal has been fabricated in complete accordance with this Section of these specifications.
- D. Name and address of Independent Testing Laboratory for approval by Engineer

1.6 PRODUCT HANDLING

- A. All materials shall be delivered, stored, and handled with care to prevent damage to any material or material coating. Material damaged or with damaged coating will be rejected and replaced at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All Structural steel, including rolled shapes, angles and plates shall conform to ASTM A572 Gr. 50 unless otherwise noted.
- B. All structural steel piping shall conform to ASTM A252, Grade 3 unless otherwise noted.
- C. All hollow structural tube sections shall conform to ASTM A-500 Grade B, unless otherwise noted.
- D. All steel items under this section shall be galvanized unless noted otherwise on the Contract Drawings. Galvanizing shall be by the hot dip method according to ASTM Specifications A-123 and A-153.

2.2 WELD ELECTRODES

- A. Weld rod shall conform to AWS E70XX grade.

PART 3 EXECUTION

3.1 FABRICATION

- A. Fabrication shall conform to AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.
- B. Workmanship shall be equal to standard commercial practice.
- C. All materials shall be clean and straight. Each assembly shall be accurately fabricated to the lines and dimensions called for and shall be free from undue twists, bends, warping, distortion, and other irregularities.

- D. Fabricate products in a fully-equipped facility capable of producing a high grade of metal fabrication work. All work shall be straight and true, and free from warpage and other defects. Joints, covers, copes, and miters shall be accurately and neatly cut, machined, field, and fitted.
- E. Carry out bolting and welding in accordance with latest approved methods, with due consideration for strength and appearance of finished product. All welding shall be done by certified welders.
- F. All steel will be free from imperfections, dirt, loose scale, paint, oil, or other foreign substances.
- G. All welds shall be made watertight.
- H. All material shall be fabricated to within + or - 1/8 inch of their theoretical dimensions as shown on the drawings.
- I. Holes for bolts shall be located as shown on the drawings and shall be drilled 1/8" in diameter larger than the galvanized bolt.
- J. All fabrication under this section shall be hot dipped galvanized in accordance with ASTM Specifications A-123 and A-153, unless noted otherwise on the Contract Documents
- K. Prior to fabricating any structural steel members, contractor shall confirm the exact field measurements of each unit to account for the subtle changes of individual unit's field condition.

3.2 INSTALLATION

- A. Store materials on skids, not on ground, in such a fashion as to prevent bending, twisting, or similar damage. Do not dump steel off truck.
- B. Clean installed work from weld spatter, dirt and other foreign materials. Protect installed work as required from damage by subsequent building operations.
- C. Joints are to be square, tight, and well-fastened with all members assembled in accordance with the Contract Drawings.

3.3 DEFECTIVE WORK

- A. Any parts damaged or improperly fabricated shall be removed and replaced or corrected as directed by the Engineer at no additional cost to the Owner.

PART 4 METHOD OF MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement of all PIER RAILING Assemblies shall be by the Contract Unit Price LINEAR FEET complete in-place.
- B. For all other metal fabrications, no separate measurement shall be made for the work in this Section. Measurement for these items shall be included within the work it is associated with.

4.2 METHOD OF PAYMENT

- A. Payment for all PIER RAILING Assemblies shall be made by the Contract Unit Price LINEAR FEET, complete in place. This price and payment shall constitute full compensation for supply and satisfactory installation of Guardrails complete in place including all labor, equipment, testing, transportation, survey, supervision, materials, galvanizing, disposal of any surplus materials, and all other items necessary for the satisfactory installation of guardrails, including all necessary hardware and any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings.
- B. For all other metal fabrications, no separate payment shall be made for the work in this Section. Payment for these items shall be included within the work it is associated with.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
05500-01	Pier Railing	LF

*** END OF SECTION ***

SECTION 05 50 13
MISCELLANEOUS METALS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.2 SCOPE OF WORK

- A. Work under this Section, without limiting the generality thereof, consists of manufacturing or shop-fabricating metal elements itemized below and installation of all materials, equipment, labor, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:
1. Miscellaneous angles and brackets
 2. Structural bolts, washers and nuts
 3. Machine bolts, washers and nuts
 4. Anchor and expansion bolts
 5. Stainless Steel (SS) pins, plates, connections and fasteners
 6. Miscellaneous fabricated elements and other hardware not otherwise identified
- B. Should drawings not agree within themselves or the specifications, the greater quantity, or superior quality of work or materials shall be included.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
1. Concrete under REINFORCED CONCRETE, SECTION 03 31 30.
 2. Metal fabrications under METAL FABRICATIONS, SECTION 05 50 00.
 3. Floats under FLOATING TIMBER DOCKS, SECTION 35 51 13.23

1.4 QUALITY ASSURANCE

- A. Except as noted elsewhere, work shall conform to the following codes and standards:
1. American Society for Testing and Materials (ASTM), latest edition.
 2. American Welding Society (AWS)
 3. American Institute of Steel Construction (AISC), latest edition.
 4. The State of Connecticut, Department of Public Works "Standard Specifications for Highways and Bridges" (ConnDOT)

1.5 SUBMITTALS

- A. Submit for approval prior to fabrication all information necessary for the fabrication of the component parts. Indicate size and weight of members, type and location of shop and field connections, and the type, size, and extent of all welds, and welding sequences. Use American Welding Society welding symbols. Approval of shop drawings will be for size and arrangement of principal and auxiliary members and strength of connections. Any errors in dimensions shown on shop drawing shall be the responsibility of the Contractor.
- B. Certificate of compliance with applicable ASTM specifications for all galvanized items shall be submitted to the Engineer with all materials delivered to the fabricator or site.
- C. Manufacturer's literature, specifications, and certification of compliance with applicable ASTM specifications for all fasteners, wire rope, chains, shackles, expansion bolts, and other connection items identified within the contract drawings.
- D. The Contractor shall use only certified welders and the shielded arc process for all welding performed in connection with the work of this Section. Each welder shall be certified for the particular work, prior to commencing the work which must be accomplished.
- E. Upon completion of this portion of the work, and as a condition of its acceptance, the Contractor shall deliver to the Engineer a letter signed by an official of the metal fabricating firm or firms certifying that all fabricated metal has been fabricated in complete accordance with this Section of these specifications.
- F. Name and address of Independent Testing Laboratory for approval by Engineer.
- G. List of all other hardware with quantities and material specifications.

1.6 PRODUCT HANDLING

- A. All materials shall be delivered, stored, and handled with care to prevent damage to any material or material coating. Material damaged or with damaged coating will be rejected and replaced at no additional cost to The Owner.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All structural steel, including rolled shapes, angles and plates shall conform to ASTM A572 Gr. 50 unless otherwise noted.
- B. All hollow structural tube sections shall conform to ASTM A-500 Grade B, unless otherwise noted.
- C. All steel items under this section shall be galvanized unless noted otherwise on the Contract Drawings. Galvanizing shall be by the hot dip method according to ASTM Specifications A-123 and A-153.

- D. Stainless Steel shall be Series 300, Type 316.
- E. All bolts for timber and/or composite materials shall conform to ASTM A307, Gr. A for Mild Steel Bolts unless otherwise noted and shall be Hot Dipped Galvanized according to ASTM Specifications A-123 and A-153.
- F. All bolts for steel connections shall conform to ASTM F3125, Grade A325 for Steel Bolts with manufacturer markings that indicate as such unless otherwise noted.
- G. Threaded rod anchors shall conform to F1554 Grade 55 unless otherwise noted.
- H. Galvanizing shall be by the hot dip method according to ASTM Specifications A-123 and A-153.
- I. Welding rods shall conform to AWS E70XX grade. Sizes shall be as indicated on the drawings.
- J. Anchor bolts shall be as indicated on drawings

PART 3 EXECUTION

3.1 FABRICATION

- A. Workmanship shall be equal to standard commercial practice.
- B. Carry out bolting and welding in accordance with latest approved methods, with due consideration for strength and appearance of finished product. All welding shall be done by certified welders.
- C. All steel shall be free from imperfections, dirt, loose scale, paint, oil, or other foreign substances.
- D. Holes for bolts shall be located as shown on the drawings and shall be drilled 1/8" in diameter larger than the galvanized bolt.

3.2 INSTALLATION

- A. Installation shall conform to AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.
- B. Parts covered by this specification shall be installed in the work as shown on the drawings.
- C. No cutting or burning of steel shall be done to install fasteners without approval of the Engineer.
- D. All epoxy anchors shall be installed fully in accordance with manufacturer's recommendations including hole drilling, cleaning and anchor installation.
- E. Store materials on skids, not on ground, in such a fashion as to prevent bending, twisting, or similar damage. Do not dump steel off truck.
- F. Clean installed work from weld spatter, dirt and other foreign materials. Protect installed work as required from damage by subsequent building operations.

- G. Joints are to be square, tight, and well-fastened with all members assembled in accordance with the Contract Drawings.

3.3 HOT DIP GALVANIZING

- A. Galvanizing shall be by the hot dip method according to ASTM Specifications A-123 and A-153.
- B. Repair of hot dip galvanizing shall be using zinc rich paint. Zinc rich paint shall be an organic zinc-rich coating containing 95% metallic zinc, by weight in the dried film.

3.4 DEFECTIVE WORK

- A. The following shall be grounds for rejection and shall be removed and replaced or corrected as directed by the Engineer at no additional cost to The Owner:
 - 1. Any damaged or improperly fabricated parts.
 - 2. Any parts improperly installed in the work.
 - 3. Any items found not to have the proper coating.
 - 4. Otherwise not according to Contract Documents.

PART 4 MEASUREMENT AND PAYMENT (PENDING – IN PROCESS)

4.1 MEASUREMENT AND PAYMENT

- A. Method of Measurement and Payment
 - 1. No separate measurement and payment shall be made for the work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

*** END OF SECTION ***

SECTION 06 14 00
TIMBER TREATMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.2 SCOPE OF WORK

- A. Work under this Section, without limiting the generality thereof, consists of the furnishing and installation of all materials itemized under MATERIALS in this Section, equipment, labor, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:
 - 1. The treatment of timber members with a wood preservative.
 - 2. The field application of all timber subject to field cutting.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Timber piles under TIMBER PILES, SECTION 31 62 19
 - 2. Timber under HEAVY TIMBER CONSTRUCTION, SECTION 35 51 00.
 - 3. Timber floats under FLOATING TIMBER DOCKS, SECTION 35 51 13.23

1.4 QUALITY ASSURANCE

- A. Except as noted all work shall conform to the latest editions of the following codes, specifications, and standards:
 - 1. American Society for Testing and Materials (ASTM) D-25.
 - 2. American Wood Preservatives Association (AWPA).

PART 2 PRODUCTS

2.1 MATERIALS

- A. All new Southern Yellow Pine and Douglas Fir timber members to which the public may be exposed (decking, handrails, benches, similar) shall be treated with alkaline copper quaternary (ACQ) in accordance with AWPA Standards for material subject to salt water use and shall obtain a green tint due to the treatment.
- B. All new Southern Yellow Pine timber members to which the public shall not be exposed (piles, stringers, pile caps, bracing, fenders, similar) shall be treated with chromated copper arsenate (CCA) in accordance with AWPA Standard P5 and U1 – UC5A for material subject to saltwater use and shall obtain a green tint due to the treatment.
- C. Creosote timber treatment is PROHIBITED

PART 3 EXECUTION

- 3.1 Prior to treatment all dimension lumber shall be kiln-dried. Conditioning by heating is not permitted.
- 3.2 All timber to be treated with alkaline copper quaternary (ACQ) shall be treated to a retention of 0.6 pounds per cubic foot.
- 3.3 All timber to be treated with chromated copper arsenate (CCA) shall be treated to a retention of 2.5 pounds per cubic foot.
- 3.4 Sealing compound for treatment of field cuts and drilled holes shall be two (2) coats of copper naphthenate meeting AWWPA standard P8.
- 3.5 Holes for bolts shall be drilled the same size as the bolt before galvanizing. Holes shall be swabbed with 2 coats of sealing compound as specified herein before installing the bolts.
- 3.6 All cut faces of timber shall be coated with a minimum of 2 coats of sealing compound as specified herein before installation.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for the work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

*** END OF SECTION ***

SECTION 09 96 00
HIGH-PERFORMANCE COATINGS

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 removal of existing paint from metal railings, repair of existing metal railings, surface preparation of railings to receive coatings and the application of high-performance coating systems. Section also includes cleaning and protecting the existing brass medallions and recaulking of all railing post holes.

1.3 DEFINITIONS

- A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

- A. Work Plan: Submit a detailed work plan describing the repair and repainting procedures that will be used to complete the work of this Section. The work plan should include means, methods, products, and procedures including but not limited to the following:
 - 1. Removal of existing coatings on railings
 - 2. Repair of existing railings, including but not limited to plugging of vent holes, installation of end caps, and new handrail extensions where missing. Prepare shop drawings including plans, details, and attachments, including method of connecting and finishing.
 - 3. Removal of and recaulking all railing post holes.
 - 4. Cleaning and protection of brass medallions
 - 5. Cleaning and surface preparation of railings to receive new coatings
- B. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
 - 3. Steel pipe.
 - 4. Fasteners.
 - 5. Caulk.
- C. Samples for Initial Selection: For each type of topcoat product indicated and caulk.

D. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Mockup shall also demonstrate the cleaning and other surface preparation methods to be used on the existing surfaces in preparation of final coatings.

1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1: "Structural Welding Code – Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Exterior High-Performance Coating Schedule for the coating category indicated.

2.2 PAINT REMOVERS

- A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste or gel formulation for removing paint from metal as required to suit Project; and containing no methylene chloride.
- B. Low-Odor, Solvent-Type Paste Paint Remover: Manufacturer's standard low-odor, water-rinseable, solvent-type paste, gel, or foamed emulsion formulation for removing paint from metal as required to suit Project; and containing no methanol or methylene chloride.

2.3 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
 - 3. Products shall be of same manufacturer for each coat in a coating system.
- C. Colors: As indicated in color schedule.

2.4 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.

3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

2.5 STEEL RAILINGS

- A. Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Tubing: ASTM A500 (cold formed) or ASTM A513, Type 5.
- C. Pipe: ASTM A53, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
- D. Plates, Shapes, and Bars: ASTM A36.
- E. Fasteners: Type 304 stainless steel or hot-dip zinc coated steel fasteners complying with ASTM A153 or ASTM F2329 for zinc coating. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
- F. Galvanizing Repair Paint: High-zinc-dust-content paint, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- G. Etching Cleaner for Galvanized Metal: Comply with MPI#25.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Prior to commencement of repair and repainting work of this Section, thoroughly examine and test as required all exterior conditions and surfaces scheduled to be repaired and repainted and report in writing to the Engineer any conditions or surfaces that will adversely affect work of this Section.
- C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

-
- B. Protect all exterior surfaces and areas, including landscaping, walks, and all adjacent surfaces from repair and repainting operations and damage by drop cloths, shields, masking, or other suitable protective means and make good any damage caused by failure to provide such protection.
 - C. Prevent chemical solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
 - 1. Cover adjacent surfaces with materials that are proven to resist chemical solutions being used. Use protective materials that are UV resistant and waterproof. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 - 2. Do not apply chemical solutions during winds of sufficient force to spread them to unprotected surfaces.
 - 3. Neutralize and collect alkaline and acid wastes before disposal.
 - 4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
 - D. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - E. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
 - F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
 - G. Galvanized-Metal Substrates: Remove oxides, grease and oil residue from galvanized metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings. Comply with coating manufacturer's written recommendations for surface preparation.
 - H. Primer shall be applied within two hours of the completion of surface preparation.

3.3 RAILING REPAIR

- A. Fit connections together to form tight, hairline joints. Adjust new railing components to ensure matching alignment at abutting joints. Provide smooth exposed surfaces with no sharp or rough areas.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
- C. Welded Connections: Use fully welded joints for permanently connecting new railing components. At exposed connections, finish exposed welds to comply with

NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.

- D. Plug vent holes smooth with surface prior to application of high performance coating.
- E. Close exposed ends of hollow existing railing members with end fittings of same metal and finish as railings. Shape of end fitting to match existing end fittings.
- F. All new railing components to receive the same high performance coating as existing railings.

3.4 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for coating and substrate indicated.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.5 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
 - 1. Contractor shall touch up and restore coated surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.6 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.7 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Galvanized-Metal Substrates:

1. Pigmented Polyurethane over Epoxy Primer System:

a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.

1) PPG Paints: Amerlock 400 High Solids Epoxy, applied at 4 mils dft.

b. Intermediate Coat: Polyurethane, two component, pigmented, gloss matching topcoat.

c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6).

1) PPG Paints: Pitthane Ultra Acrylic Aliphatic Urethane Gloss 95-812, applied at 2 mils dft per coat.

a) Apply two coats.

b) Color: park standard blue color - PPG97-8800 Founders Blue.

PART 4 - MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

A. Measurement for HIGH PERFORMANCE COATINGS shall be made by the Contract Price Lump Sum and shall be measured once only for this Contract.

4.2 METHOD OF PAYMENT

A. Payment for HIGH PERFORMANCE COATINGS shall be by the Contract Price Lump Sum for the paint removal, cleaning, repair, preparation, and repainting and recaulking of all metal railings indicated as such within the Contract Documents or otherwise as directed by the Owner. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, disposal, storage, handling, protection, maintenance, and supervision for the satisfactory completion of all items under this section.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
09 96 00	HIGH PERFORMANCE COATINGS	LS

END OF SECTION

SECTION 09 96 26
MARINE COATINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.2 SCOPE OF WORK

- A. Work under this Section, without limiting the generality thereof, consists of the furnishing and installation of all materials, equipment, labor, testing, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:
1. Hot Dipped Galvanized:
 - a. All hardware and fasteners unless noted otherwise
 - b. Chain tensioners, chain anchor plates, chain, shackles, and all other hardware associated with connections.
 - c. Guardrail
 - d. All other metal fabrications unless noted otherwise

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS:

- A. The following items of labor and/or materials and equipment are furnished and/or installed under other Sections of the specifications.
1. Concrete under REINFORCED CONCRETE, SECTION 03 31 30
 2. Metal fabrications under METAL FABRICATIONS, SECTION 05 50 00.
 3. Miscellaneous metals under MISCELLANEOUS METALS, SECTION 05 50 13
 4. Floats under FLOATING TIMBER PIERS, SECTION 35 51 13.23

1.4 QUALITY ASSURANCE

- A. Except as noted, work shall conform to the latest editions of the following codes, specifications, and standards:
1. Steel Structures Painting Council (SSPC): Surface Preparations Specifications, specifications and standards herein referred to.
 2. American Society for Testing and Materials (ASTM): specifications and standards herein referred to.

1.5 SUBMITTALS

- A. Manufacturer's literature and recommended application instructions. Certification that materials meet specification requirements.
- B. Color of coatings with samples.

- C. Name and address of a licensed independent testing service for approval by Engineer.
- D. Test reports including:
 - 1. Surface preparation verification
 - 2. Holiday detection
 - 3. Adhesion tests
 - 4. Thickness measurements

1.6 FIELD TESTING

- A. All coated elements shall be thoroughly inspected by an independent coating inspection by non-destructive methods.
- B. Coatings may be inspected by the Owners representative
- C. using holiday detectors, field adhesion tests, or a combination of both.

1.7 PRODUCT HANDLING

- A. All coated materials shall be delivered, stored, and handled with care to prevent damage to the coating.
- B. All coated materials, especially piles, shall be installed in such a manner that minimizes damage to the coating.
- C. Materials with damaged coatings will be rejected at the sole discretion of the Owners representative, and the materials replaced, unless otherwise agreed to by the Owner, at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Guardrails and all fabricated metals shall be hot dipped galvanized.
- B. All fasteners, bolts, nuts, washers, splice plates, spacer plates, and shim plates shall be hot dip galvanized unless noted otherwise on the Contract Documents.
- C. No coating of stainless steel is required.

PART 3 EXECUTION

3.1 SHOP SURFACE PREPARATION

- A. General
 - 1. All surfaces shall be thoroughly prepared for coating application in strict accordance with the coating manufacturer's recommendation and these specifications. All cleaning and coating work must be performed in a climate controlled building. Before grit blasting, the temperature shall be a minimum of 10°F above the dew point, and steel temperature shall

be maintained at ambient room temperature or as otherwise required by manufacturer's recommendations. The contractor shall monitor the temperature and dew point throughout the cleaning and coating process.

2. Grit blasting shall be to clean grey metal, at least equivalent to a Near White as defined by SSPC Specification SP-10. All work blasted in one day must be coated the same day.
3. Any areas of the surface which show traces of oil, grease, or other organic matter shall be removed prior to coating. The contamination shall be removed by using either a solvent or spot blasting.
4. All surfaces to be coated must be completely dry, free of moisture, soil, dust, and grit at the time coating is applied.
5. The Owner or Engineer shall have access to each part of the process and shall have the right and opportunity to witness any of the quality control tests and/or perform such test there self on a random sampling basis.

3.2 COATING

A. General

1. Prior to installation, all connections and items which will become inaccessible after installation shall be coated.
2. After coated items have been installed, field coat all accessible areas which have been scraped or chipped.
3. After field coating and touch up of coatings, the coating shall have a uniform, consistent finish, including the color and appearance of the coating. Owner reserves the right to reject any materials considered to not have a uniform, consistent coating and have them either replaced or re-coated by the Contractor at no additional cost to the Owner.

B. Galvanized Steel – Touch Up

1. Repair of hot dip galvanizing shall be using zinc rich paint. Zinc rich paint shall be an organic zinc-rich coating containing 95% metallic zinc, by weight in the dried film.

3.3 HOT DIP GALVANIZING

A. Galvanizing shall be by the hot dip method according to ASTM Specifications A-123 and A-153.

B. Repair of hot dip galvanizing shall be using zinc rich paint. Zinc rich paint shall be an organic zinc-rich coating containing 95% metallic zinc, by weight in the dried film.

3.4 CARE OF EXISTING WORK

A. Existing work shall be protected from spillage and spattering during application of coatings.

B. All spillages and splatterings shall be cleaned up immediately. Contractor is responsible to leave existing areas free of all such foreign materials.

3.5 DEFECTIVE MATERIALS

A. Coating which, in the opinion of the Owner or Engineer, does not meet acceptance due to improper coating, storage, handling, installation or other damage shall be rejected. The rejected materials shall be, at the sole discretion of the Owner, either replaced with coated new material

or completely cleaned to base material and re-coated in accordance with these specifications for shop coating of materials. This work shall be done at no additional cost the Owner.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for the work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

*** END OF SECTION ***

SECTION 10 14 00

SIGNAGE

PART 1 GENERAL

1.1. DESCRIPTION

- A. Provide all labor, materials, equipment, and supervision necessary to complete the work specified in this Section.
- B. Scope of work includes, but is not limited to the fabrication and installation of the following signage:
 - 1. Two (2) sets Entrance Gateway Signage - EGS
 - 2. One (1) Amenity Signs - AMS
 - 3. Two (2) Conduct/Rules Signs – CRS
 - 4. Two (2) Post Mounted Directionals - PMD
 - 5. Ten (10) Lamp Mounted Directionals - LMD
- C. Scope of work includes fabrication and installation of the following wayside displays:
 - 1. Ten (10) Pedestrian Wayside – Railing - PWR
 - 2. One (1) Pedestrian Wayside – Lookout - PWL
- D. Scope of work includes fabrication and turn over to the Owner the following items:
 - 1. Twenty (20) Entry Point Restriction Signs as noted on drawings.

1.2. SUBMITTALS

- A. Product Data: For each type of product indicated. See 6.1 Submittal/Samples Key.
- B. Shop Drawings: Show fabrication and installation details for signage.
 - 1. Include plans, elevations, sections, details, and attachments to other work
 - 2. Field Measurements: Indicate measurements on Shop Drawings. Drawings will not be approved without field verification.
 - 3. Provide message list, timesteps, graphic elements, and layout for each in scale adequate to review each layout.
 - 4. Show graphic style, colors, finishes, timesteps, and graphic symbols.
- C. Samples for Verification: Supply actual materials in the colors which will be used for review:
 - 1. Aluminum: each thickness. For each form, finish, and color, on 6-inch-long sections of extrusions and squares of sheet at least 4 by 4 inches in each paint color
 - 2. Vinyl sheet – each type, cut characters and graphic symbols. Include representative samples of available timesteps and graphic symbols. Include a full-size representative sample at 6 by 6 inches of surface-applied graphic symbol and character. Print sample sheets – Include a full-size representative sample at 6 by 6 of artwork.

- D. Sign Schedule: Use same designations indicated on Drawings.
- E. Maintenance Data: For signs to include in maintenance manuals.
- F. Warranty: Product warranties, if applicable. Sign Contractor Warranty of 2 years.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Aluminum Sheet and Plate: Provide aluminum sheet of 6061-T6 alloy and temper recommended by aluminum producer or finisher for use type and finish indicated, and with not less than strength and durability properties specified in ASTM B 209 (ASTM B 209M)
- B. Aluminum Extrusions: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5 specified in ASTM B 221 (ASTM B 221M).
- C. Stainless Steel Extrusions: Provide round of 304 alloy and temper recommended by metal producer or finisher for type of use indicated, and with at least the strength and durability properties of: tensile at 80,000 psi and yield of 43,000 psi with machinability of 48% or higher and hardness of 150 BHN specified in ASTM A 276/479 (ASM 5639/5647).
- D. Applied Vinyl: digitally produced and cut by computer-driven process on vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications. High performance rated vinyl by 3M.
- E. Paint/Polyurethane Coatings: Acrylic Polyurethane Enamel: two-component, acrylic modified, aliphatic polyurethane enamel having UV inhibitors and engineered for application to signage components. Satin sheen. Matthews Paint Co. "Matthews Acrylic Polyurethane".
- F. Fastening: On sign-face surface of sign panels shall not be exposed unless noted in drawings. Sign- face surfaces shall not be penetrated during fabrication or installation of signs. Sign-face surfaces shall not be deformed, distorted or discolored by attachment of concealed fasteners. Use 300 Series non-magnetic stainless-steel fasteners. Exposed fasteners to be painted to match surrounding surfaces.
- G. Adhesives: In accordance with recommendations made by manufacturer of material to be laminated or adhered. Adhesives that fade, discolor, or delaminate as a result of ultraviolet light or heat shall not be used. Adhesives shall be of non-staining and non-yellowing quality. Visible joints shall be free from air bubbles and other defects.

- H. Concrete: Follow all requirements concerning concrete methodologies as noted in sitework sections of this specification.

PART 3 EXECUTION

- 3.1 Workmanship: Work shall be assembled in the shop, insofar as practicable, ready for installation at the site. Work that cannot be shop assembled shall be given a trial fit in the shop to ensure proper field assembly.
- 3.2 No fabrication materials or procedures shall be used that will in any way change visual quality or in any manner have an adverse effect on existing materials or surfaces.
- 3.3 Sign fabrication shall be a complete system including stiffeners, fasteners, welding, sealants, jointing, miscellaneous pieces and material thickness. Connections, angles, shapes and details shown are diagrammatic in nature and are to be sized, reinforced and detailed by fabricator.
- 3.3.1 In fabrication of metal pans and/or faces in sign structures “oil canning” surface appearance will not be acceptable.
- 3.3.2 Holes for bolts and screws shall be drilled or punched. Drilling and punching shall produce clean, true lines and surfaces. Tapping shall be precise and to the fastener specified.
- 3.3.3 Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
- 3.3.4 Welding shall be continuous along the entire area of contact. Exposed welds shall be ground smooth.
- 3.3.5 Exposed surfaces of work shall have a smooth finish and exposed fastening shall be flush unless specified.
- 3.3.6 Fastenings shall be concealed where practicable, otherwise locate fasteners where they will be inconspicuous.
- 3.3.7 Items specified to be galvanized shall be by hot dip process after fabrication if practicable. Galvanization shall be in accordance with ASTM A 123 and ASTM A 525, as applicable. Joints exposed to the weather shall be formed to exclude water.
- 3.3.8 Drainage and weep holes shall be included as required to prevent condensation buildup.
- 3.3.9 Use PVC Duct Couplings, flexible or ridged, as a barrier only to protect stainless and aluminum extrusions from making contact.

3.4 Shop Painting: Grind welds smooth and fill prior to priming and finish painting. Sand exposed surfaces smooth Shop prime surface per paint manufacturer's recommendation.

Apply manufacturer's recommended thickness of polyurethane enamel and primer in accordance with manufacturer's standard practice. Upon completion of work, thoroughly recoat/touch up all damaged surfaces to be as undetectable.

3.5 Do not paint surfaces of items to be embedded in concrete. Prime concealed aluminum surfaces in contact with masonry, concrete or plaster with even coat of alkali resistant asphaltum (asphalt emulsion) base paint.

3.6 Applied Lettering and Graphics: Provide the letters, numerals, symbols, and other graphic markings photos, and artworks, using the finish materials indicated. Apply the graphics neatly, uniformly proportioned and spaced, and accurate within dimensions indicated. Prepare the substrate surfaces and apply finish materials in accordance with manufacturer's instructions. Lettering shown on sign type drawings are intended as guidelines for layouts, type size and font face only. Complete copy text shall be in accordance with information noted on drawings.

3.6.1 Spelling and punctuation shall be correct. Should an error in spelling or punctuation be found, or spelling appear questionable, notify Designer before proceeding.

3.6.2 Translations and Artwork: Any second language text, as noted in drawings and any artwork noted for waysides, is the responsibility of the Owner.

3.6.3 Sign type drawings and layout of copy contained within the schedule of graphics are based on scale calculations of the message lengths within given estimated sign areas. Should conflict arise in final message layout, notify Designer before proceeding.

3.6.4 Align letterforms to maintain baseline parallel to sign format. Maintain margins as specified in sign type layouts.

3.7 Adhesives: In accordance with recommendations made by manufacturer of material to be laminated or adhered. Adhesives that fade, discolor, or delaminate as a result of ultraviolet light or heat shall not be used. Adhesives shall be of non-staining and non-yellowing quality. Visible joints shall be free from air bubbles and other defects.

3.8 Silicone Adhesives: Ready to use, high performance adhesive. General Electric GC 1200 sealant, translucent SCS 1201 or equal as recommended by manufacturer for bonding condition.

3.9 Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

3.10 INSTALLATION

- Install sign units (and components at locations shown or scheduled), securely mounted with concealed, theft-proof fasteners. No exposed fasteners for installation are to be visible unless written approval is obtained from Designer. Attach signs to substrates in accordance with manufacturer's instructions. Provide anchorage and fitting coordinate location in field with Designer. Support signs until setting time of adhesive with foam tape or other mechanical means that does not damage surrounding surfaces.
- 3.10.1 Securely mount signage in accordance with manufacturer's recommendations and as indicated, set plumb, level and true to line, and at proper height, without warp or rack. Follow recommendations and instructions for installation as provided herein (or by manufacturer where instructions are provided). Notify Designer in writing if such installation will not provide permanent, rigid installation in existing conditions
 - 3.10.2 Coordinate and field measure proper location of sign units, where required
 - 3.10.3 Repair or replace damaged units as directed by Designer.
 - 3.10.4 Coordinate sign locations with existing mechanical, electrical, plumbing and landscape elements and notify Designer in writing of any visual or physical conflicts. Coordinate installation of electrical connections with Contractor.
 - 3.10.5 Sealants: Apply in one uniform, continuous bead.
- 3.11 Signs shall be installed at locations shown on the drawings. Coordinate and field measure proper location of signs with Designer. All signs shall be installed plumb and true at mounting heights indicated, and by method shown or specified. Signs mounted on other surfaces shall not be installed until finishes on such surfaces have been completed.
- 3.11.1 Anchorage: Anchorage not otherwise specified or indicated on drawings shall include expansion shields, chemical and power-driven fasteners when approved for concrete; machine carriage bolts for lamp post brackets.
 - 3.11.2 Bracket-Mounted Lamp Post Directional Signs: Provide manufacturer's stainless standard brackets, fittings, and hardware for mounting signs that project from post perpendicular to path. Attach brackets and fittings securely to prevent movement.
- 3.12 At completion of Work, clean sign surfaces so they are free of residue and other foreign materials, leaving ready for acceptance by Owner or Designer.
- 3.13 Repair: Promptly repair any damage to adjacent surfaces which occurred during installation.
- 3.14 Touch Up: Upon completion of installation, visually check exposed surfaces of Work of this specification, and touch up scratches and abrasives to be completely invisible to unaided eye from a distance of five feet.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

Measurement for Signage shall be made as per the units and lump sum items completed under this contract.

4.2 METHOD OF PAYMENT

- A. Payment for Signage shall be made in accordance with the unit price contained in the Contractor's Bid Form. Prices shall include all costs for the materials, products, and installation. shall be by the Contract Prices for the fabrication and installation of signage as shown in the Contract Documents.
- B. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, transportation, marking, permit fees, storage, handling, protection and supervision for the satisfactory completion of all items under this section.

4.3 PAYMENT ITEMS

- A. All payment terms will be per Specification 01 22 00 Measurement and Payment and the unit pricing or lump sum pay items as per the Contractor's Bid Form. Project is tax exempt.
- B. All samples, message schedule, and shop drawings with verified field conditions, etc., are required to be submitted as per Specification Section 01 33 00 Submittals.
- C. Signage Payment Items and Quantities are summarized (for general information only) as follows:

ITEM	SIGN	QTY	NAME	UNIT
101400-1	EGS	2	ENTRY GATES	EA
101400-2	AMS	1	AMENITY	EA
101400-3	CRS	2	CONDUCT	EA
101400-4	PMD	2	POST DIR	EA
101400-5	LMD	10	LAMP DIR	EA
101400-6	PWR	10	PED WAYSIDE	EA
101400-7	PWL	1	LO WAYSIDE	LS
101400-8	ENT PT	20	RESTRICT	EA

4.4 FORMAT EXHIBITS

SUBMITTAL AND SAMPLES KEY

Great River Park Improvements Sign Submittal Items	Shop Drawings	Message Schedule Item	Sign Copy Layout	Manufacturer Information	VIF Required prior to shop dwg	Material and Paint Sample
Entrance Gateway Signage - EGS	*		*		*	* Alum plate with UV digital print sample section
Amenity Signs - AMS	*		*			* Extrusion & plate in finish specified
Conduct/Rules Signs – CRS	*	*	*1			* Extrusion & plate in finish specified/UV digital print sample section
Post Mounted Directionals - PMD	*	*	*			
Lamp Mounted Directionals - LMD	*	*	*	*2	*	* Alum plate in finish specified with sample lettering
Pedestrian Wayside – Railing - PWR	*		*		*3	* Alum plate with UV digital print sample section
Pedestrian Wayside – Lookout - PWL	*		*		*3	* Alum plate with UV digital print sample section
Entry Point Restriction Signs	*		*4			* Alum plate with UV digital print on reflective sample section
	*	Required to submit				
	*1	Spanish translation provided by Owner				
	*2	All hardware to be used				
	*3	Artwork to be provided by Owner				
	*4	One of each design layout specified				

*** END OF SECTION ***

SECTION 26 00 00

ELECTRICAL – GENERAL

PART 1 GENERAL

1.1. WORK INCLUDES

- A. Installation of new fishing pier light on new foundation, as described on the Contract Drawings.
- B. Removal and replacement of existing decorative Sentry light poles and luminaires, foundations, and conduit, as described on the Contract Drawings.
- C. Decorative Light Poles on new foundations
- D. Decorative Light Poles on existing foundations
- E. Applicable details are included in Section 26 00 00 and on the Contract Drawings.

PART 2 PRODUCTS

2.1 PRODUCT NOTES

- A. Applicable products are included in Specification 26 10 00 ELECTRICAL MATERIALS AND INSTALLATION and the Contract Drawings.
- B. All Decorative Sentry light poles and luminaires will be provided by the project OWNER.
- C. Pier light fixture and pole are to be provided by the CONTRACTOR.

PART 3 EXECUTION

3.1 ELECTRICAL METHODS

- A. Work in this section shall be performed in accordance with Specification 26 10 00 ELECTRICAL MATERIALS AND INSTALLATION and the Contract Drawings.
- B. CONTRACTOR shall perform all installations in accordance with applicable electrical codes and shall refer to codes for guidance if details are not specified in the plans or specifications.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for FISHING PIER LIGHT shall be made on a Lump Sum basis for installation of the pier light fixture, pole, pole base/foundation, conduit, wiring, connection to power source, testing, and all work associated with the fishing pier light as described on the Contract Drawings.
- B. Measurement for DECORATIVE LIGHT POLES – WITH NEW FOUNDATIONS shall be made by the Contract Unit Lump Sum for installation of the 11 decorative Sentry light poles on new foundations, including new foundations, conduit, wiring, connection to power source, testing, and all work associated with the decorative Sentry light poles as described on the Contract Drawings. Removal of the existing light poles, foundations, conduits, wire, etc. will not be measured separately for payment. Restoration of site conditions will not be measured separately for payment.

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- C. Measurement for DECORATIVE LIGHT POLES – EXISTING FOUNDATIONS shall be made by the Contract Unit Price for installation of the Sentry light pole on existing foundation, including wiring, connection to power source, testing, and all work associated with the decorative Sentry light pole replacement as described on the Contract Drawings. Removal of the existing light poles will not be measured separately for payment. Restoration of site conditions will not be measured separately for payment.

4.2 METHOD OF PAYMENT

- A. Payment for FISHING PIER LIGHT shall be by the Contract Lump Sum Price for the installation of the fishing pier light as shown in the Contract Drawings. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection, and supervision for the satisfactory completion of all items under this section. CONTRACTOR shall provide the light pole and luminaire.
- B. Payment for DECORATIVE LIGHT POLES – WITH NEW FOUNDATIONS shall be by the Contract Lump Sum Price for the installation of the 11 decorative Sentry light poles on new foundations as shown in the Contract Drawings. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection, and supervision for the satisfactory completion of all items under this section. Decorative light poles and luminaires to be provided by OWNER at no cost to Contractor.
- C. Payment for DECORATIVE LIGHT POLES – EXISTING FOUNDATIONS shall be at the Contract Unit Price for the installation of the decorative Sentry light poles on existing foundations as shown in the Contract Drawings. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection, and supervision for the satisfactory completion of all items under this section. Decorative light poles and luminaires to be provided by OWNER at no cost to Contractor.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
260000-1	Fishing Pier Light	LS
260000-2	Decorative Light Poles – With New Foundations	LS
260000-3	Decorative Light Poles – Existing Foundation	EACH

*** END OF SECTION ***

SECTION 26 10 00
ELECTRICAL MATERIALS AND INSTALLATION

PART 1 GENERAL

1.1. SUMMARY

- A. Requirements specified on sheets E-0 through E-4, along with electrical specifications and all its sections, comprise the contract documents for the electrical scope of work. Drawings and all their revisions up to the bid submittal date become a binding part of the contract, along with these specifications as though they were one, and anything implied by the specifications shall be interpreted as also implied by the drawings and vice versa. Provide necessary items for a complete installation of all electrically operated equipment listed in the specifications or shown on the contract drawings.
- B. All drawings and specifications (including structural, civil and equipment) are incorporated into, and become a part of this division. This contractor shall examine all such drawings and specifications and become thoroughly familiar with the provisions contained therein. The submission of his bid shall indicate such knowledge.
- C. Electrical drawings are diagrammatic. They are intended to show the approximate locations of equipment and conduit. Dimensions given on the plans, in figures, shall take precedence over scaled dimensions and shall be verified in the field. The electrical contractor shall layout all equipment rooms to make sure the equipment, as purchased, fits in the room or space shown. Exact location of all equipment shall be verified in the field and routing of conduits shall suit field conditions.
- D. Until the time of installation, the owner/engineer reserves the right to make minor changes in the location of conduit and equipment without additional cost to the contract.
- E. The electrical drawings and specifications are intended to supplement each other. Material and labor necessary to the project shall be furnished and installed even though not specifically mentioned in both. Labor and/or materials neither shown nor specified, but obviously necessary for the completion and proper functioning of the system, shall be furnished and installed by the electrical contractor at no additional cost.
- F. Arrange all equipment substantially as shown on the drawings. Make deviations only where necessary to avoid interference. Check all equipment sizes against available space prior to shipment to avoid interference.
- G. Examine the work of other trades insofar as their work comes in contact with or is covered by this work. In no case attach to, or finish against any defective work or install work in a manner which will prevent proper installation of the work of other trades.
- H. Electrical contractor shall verify with other trades all electrical characteristics of equipment requiring electrical connections. Contractor shall verify voltage, phase and horsepower and shall notify engineer of any discrepancies prior to start of

work. Electrical contractor shall provide disconnecting means and overload protection for all equipment, unless furnished integral with equipment package.

- I. It is the intent of these drawings that this be a complete electrical job. Any errors or omissions shall be brought to the attention of the engineer prior to bidding the job.
- J. The contractor shall visit the site of the work and familiarize himself with all conditions affecting his work. The submission of his proposal shall indicate such knowledge. No additional payment shall be made on claims that arise from a lack of knowledge of the existing conditions.

1.2. CODE AND PERMITS

- A. Installation shall be in full accordance with all codes, rules and regulations of municipal, city, county, state and public utilities and all other authorities having jurisdiction over the premises.
- B. Comply with any specification requirements that are in excess but not in conflict with code requirements.
- C. The contractor shall secure and pay for all electrical permits, plan reviews and certificates of inspection in connection with his work. Before final payment of the contract is allowed, all certificates shall be delivered to the owner/engineer in duplicate.
- D. Electrical material and equipment shall bear the UL label except where UL does not label such types of material and equipment.

1.3. SHOP DRAWINGS AND SUBMITTALS

- A. The electrical contractor shall submit electronic (PDF) files for all shop drawings. The shop drawings of the following equipment using the indicated numbering system and titles, shall be submitted through the owner/engineer to the engineer and then resubmitted for final approval, if necessary. Shop drawings shall be submitted for the following items:
 - 1. Conductors and raceways
 - 2. Handholes
 - 3. All precast concrete structures
 - 4. Contactors, time switches, and photocell
 - 5. Lighting fixture and pole for Fishing Pier Light only
- B. All submitted shop drawings (manufacturers "equipment descriptive sheets or vendors" prepared drawings) shall have the general contractor's or subcontractor's "stamp of approval" indicating that the item submitted is as called for on the plans and specifications, is approved by the general contractor or subcontractor, the date of approval and initialed by the person approving the submittal and the name of the company submitting said equipment for approval.
- C. Submit complete PDF documents with a table of contents. Any submittals not in an acceptable format or not as specified shall be returned for resubmittal.
- D. All descriptive literature shall be submitted identifying the following:

1. Name of the job.
 2. Location of the job, address, city and state.
 3. Name and address of the company submitting the brochures.
 4. Date of the submittal.
- E. Every effort shall be made, in checking the shop drawings, to detect and correct all errors, omissions and inaccuracies. Failure to do this will not relieve the electrical contractor of the responsibility for the proper and complete installation in accordance with the contract documents.
- F. Submittals must be project specific with all options and accessories clearly indicated. Generic brochures, catalog pages, or specification sheets will be rejected without review.
- 1.4. RECORD DRAWINGS
- A. Submit to the owner/engineer one set of reproducible electrical drawings in AutoCAD format showing the record conditions.
- 1.5. STANDARDS AND SUBSTITUTIONS
- A. Wherever the words "approved by", "approved equal", "as directed" or similar phrases are used in the following specifications, they shall be understood to refer to the owner as the approving agency. The name or make of any equipment or materials named in this specification (whether or not the words "or approved equal" are used) shall be known as the "standard".
- B. These specifications establish quality standard of materials and equipment to be provided. Specific items are identified by manufacturer, trade name or catalog designation. This contractor shall submit his base bid price based upon standard specified equipment described herein and as detailed on drawings and associated contract documents. These specifications are not to be considered proprietary the contractor may submit information on materials and manufacturers (other than those listed) for review by the owner/engineer and engineer no later than ten (10) days before bids are submitted. In addition, samples of proposed equipment may be required to be submitted to the engineer for review no later than ten (10) days before bids are submitted. Manufacturers of products accepted by the owner/engineer and engineer will be listed in an addendum to the specifications as an acceptable substitution equipment accepted as detailed below and shall be shown as a separate add or deduct price to be factored into the base bid price by the owner/engineer and owner if accepted.
- C. Should the contractor propose to furnish materials and equipment other than those specified or approved by addendum, submit a written request for substitutions to the owner/engineer at the bid opening. The request shall be an alternate to the original bid; be accompanied with complete descriptive (manufacturer, brand name, catalog number, etc.) And technical data for all items. Failure by this contractor to submit the requisite documentation detailed above shall be understood by the owner/engineer and engineer to indicate that substitute equipment will not be presented by the contractor for consideration. Such substitutions will not be considered after the bid opening date and delay of project will not be permitted for further inspection and evaluation after this date.

- D. Where such substitutions alter the design or space requirements indicated on the drawings, include all items of cost for the revised design and construction including cost of all allied trades involved.
 - E. Acceptance or rejection of the proposed substitutions shall be subject to approval of the owner/engineer and engineer. If requested, the contractor shall submit (at his cost) inspection samples of both the specified and proposed substitute items.
 - F. In all cases where substitutions are permitted, the contractor shall bear any extra cost of evaluating the quality of the material and equipment to be provided, including all arch/engineer fees associated with change.
- 1.6. TESTING AND PLACING IN SERVICE
- A. Any material or equipment failing a code-required test shall be repaired or replaced at the contractor's expense.
- 1.7. INTERFERENCES
- A. It shall be the duty of this contractor to report any interferences between his work and that of any of the other contractors or existing conditions as soon as they are discovered. The owner/engineer shall determine which equipment will be relocated, regardless of which was installed first. This decision will be final.
- 1.8. QUALITY ASSURANCE
- A. All products shall be new and of the type and quality specified. Where materials, equipment, apparatus or other products are specified by manufacturer, brand name, type of catalog number, such designation shall establish the standards of the desired quality and style. It is the intent of these specifications to establish a standard of quality of materials and equipment installed.
- 1.9. NAMEPLATES
- A. Furnish and mount on each panelboard, switchboard (including branch switches), large junction box, safety switch, starter, remote control, push button station, and all similar controls, a nameplate descriptive of the equipment or equipment controlled.
 - B. Provide black and white nameplates constructed from laminated phenolic with a white center core. Letters shall be engraved in the phenolic to form white letters 3/8" high. Fasten the nameplates with screws and an adhesive type fastener.
- 1.10. MOUNTING ACCESSORIES
- A. This contractor shall furnish and install all angle iron, channel iron, rods, supports, hangers, concrete or plywood required to install, mount and support any electrical equipment or device called for on the plans.
 - B. Supporting material shall be complete with hangers, connectors, bolts, clamps and necessary accessories to make a complete installation. Supporting material shall be galvanized, painted or otherwise suitably finished. Products by Brinkley, Steel City or Raco will be acceptable.

PART 2 PRODUCTS

- 2.1. Product information is included in PART 1 GENERAL and PART 3 EXECUTION of this specification.

PART 3 EXECUTION

3.1 EXCAVATION

- A. The electrical work for construction proposed shall conform to all federal, state, all specific safety requirements and the requirements of the current edition of the nec.
- B. Equipment connections, starters, disconnect switches, control transformers and pushbutton stations for the equipment furnished by the owner or under a separate contract shall be installed and connected under this division, as indicated on the contract drawings.
- C. All cutting, patching, excavating, backfilling and concrete work related to this contract will be the responsibility of the electrical contractor. This contractor shall assume the responsibility of providing the sleeves, chases and openings necessary for the electrical installation and for their repair in an acceptable manner, as determined by the owner/engineer.
- D. The contractor shall be responsible for ensuring that all required access panels are operable for related to his work, and shall coordinate with owner/engineer prior to completion of work.

3.2 MATERIALS AND WORKMANSHIP

- A. All work shall be installed in a practical and workmanlike manner, by mechanics skilled in the several trades necessary.
- B. All materials shall be new and free from defects and shall be the best of their several kinds unless specified or indicated on the drawings to the contrary.
- C. During each phase and at the completion of the construction, this contractor shall remove all debris and excess materials caused by his work. He shall leave the area of operation broom clean.
- D. All electrical equipment shall bear the underwriters laboratories label or ETL label.
- E. This contractor shall guarantee his workmanship and material (lamps excepted) for a period of one year from the date of building opening and leave his work in perfect order at the completion. Should defects develop within the guarantee period, the contractor shall, upon notice of the same, remedy the defects and have all damages to other work or furnishings caused by the repairs corrected at his expense to the condition before such damage.

3.3 SCOPE OF WORK

- A. The electrical contractor shall provide all labor, material, storage, unpacking and placement; to include but not be limited to, the following items:
 - 1. Complete power and lighting distribution system including all conduits, raceways, feeders, panels, and circuit breakers as per code
 - 2. Complete branch circuit wiring systems
 - 3. Lighting pole/fixture and lamp installation (pole/fixtures and lamps to be provided by owner at no cost to contractor)
 - 4. Testing of all cables and circuit wiring after installation
 - 5. Lighting controls/sensors

6. Grounding of the electrical system

3.4 GROUNDING AND BONDING

- A. Ground all equipment per NEC.
- B. All conduits shall contain a code-sized ground wire sized per nec in addition to the conductors shown on the plans. Where circuit conductors are increased in size for voltage drop, the ground wire size shall be increased proportionately.
- C. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

3.5 WIRE AND CABLE

- A. Color code conductors (except control and instrumentation conductors) as follows:

240/208/120v system

- 1. Phase A - black;
 - 2. Phase B - red;
 - 3. Neutral - white;
 - 4. Ground - green.
- B. #12 and #10 conductors shall have continuous insulation color, as listed above.
 - C. Color code conductors larger than above, which do not have continuous insulation color by application of at least two laps of colored tape on each conductor at all points of access including junction boxes. Color tape shall be the equal of 3m products scotch #35.
 - D. Conductors shall be soft annealed copper insulated for 600 volts unless specifically indicated otherwise.
 - E. Aluminum conductors are not allowed on this project.
 - F. Insulation type shall for all conductors shall be type xhhw-2.
 - G. Conductors #8 AWG and larger shall be stranded.
 - H. Conductors #10 AWG and smaller shall be solid.
 - I. Install wiring in conduit.
 - J. Connectors:
 - 1. Connectors shall be Polaris SLWB connectors suitable for submerged applications.
 - 2. Specific connectors, lugs, etc. shall be submitted for review by the Owner and Engineer and subject to approval prior to use; and are further subject to the owner's preference for certain manufactured products.
 - K. Insulate splicing connectors to at least 200% of the wire insulation. Use pre-stretched tubing connector insulators, 3m pst for #2 and larger conductors.

- L. Pull conductors using recognized methods and equipment leaving at least 6" wire at all junction boxes for connections.
- M. Cleanout each conduit system before pulling wire.
- N. Form and tie all wiring in panelboards.
- O. There shall be no wirenut joints or splices made inside switchboards or panelboards.
- P. Branch circuit wire sizes (and conduits) shall be increased from those indicated on the plans if determined necessary to prevent excessive voltage drop. Branch circuits shall be installed with wires of sufficient size so that voltage drop between the panel and the loads does not exceed limit of 2%.
- Q. Wire sizes shall be based on the 75 degrees c. Ampacities.
- R. Circuits may be multi-plexed in conduit provided wire is properly derated and conduit sized per code. Under no circumstance shall more than (8) current carrying conductors be run in a single conduit.

3.6 RACEWAYS

- A. All wire shall be run in accordance with code in corrosion resistant, rigid, threaded, metal conduit or schedule 40 PVC unless otherwise specifically stated herein.
- B. Use watertight joints with buried and concrete encased conduit. All buried conduits outside of buildings shall have a minimum of 24" of cover. Metal conduits buried in earth shall be painted (two coats) with heavy asphaltum paint.
- C. Support runs of conduit as detailed in the appropriate table of the national electrical code (nec).
- D. Install empty conduit for future use as indicated on the drawings. Conduit shall be complete with jetline or pull rope, junction/outlet boxes, tile rings and appropriate cover plates.
- E. Thread lubrication/sealant is required on outdoor and underground threaded metal joints.

3.7 PULL AND JUNCTION BOXES

- A. Install pull and junction boxes where shown on the drawings, and where required for changes in direction, at junction points, and to facilitate wire pulling. Furnish box sizes in accordance with nec unless larger boxes are indicated. Boxes installed for underground work shall comply with Connecticut Department of Transportation standards and requirements.
- B. Provide concrete boxes for underground work unless otherwise indicated on the drawings.
- C. Provide top cover that provides full coverage over box. Inset style is not acceptable.

3.7 LIGHTING POLES AND FIXTURES

- A. New lighting fixtures shall be as listed on the plans.
- B. All decorative lighting poles, luminaires & lamps shall be Sentry Electric model shown on Sheet E-003 and shall be furnished by the owner. Installation, wiring, and operation shall be by the electrical contractor unless otherwise provided by the owner. Installation shall include final testing and acceptance by owner.

- C. The Fishing Pier pole and fixture shall be per Features and Specifications listed on Plan Sheet E-004 by Lithonia Lighting. Pole shall have a minimum shaft wall thickness of 0.250 inch.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. Included in Specification 26 00 00 ELECTRICAL GENERAL.

END OF SECTION

SECTION 31 00 00
EARTHWORK

PART 1 GENERAL

1.1. WORK INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete the work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to the following:
 - 1. Excavation, filling, and compaction of granular materials.
 - 2. Grading, compaction, and subgrade preparation for surface areas.
 - 3. Preparation of granular base for all footings.
- C. Related work specified in other Sections:
 - 1. Section 310519 – Geotextiles
 - 2. Section 312313 – Subgrade Preparation
 - 3. Section 313700 – Riprap and Riprap Bedding
 - 4. Section 329115 – Soil Preparation (Performance Specification)
 - 5. Section 033130 – Reinforced Concrete

1.2. QUALITY ASSURANCE

- A. Except as noted, work shall conform to the latest editions of the following code, specifications, and standards:
 - 1. American Society for Testing and Materials (ASTM)
 - 2. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction, Form 818.
- B. Soil testing and inspection service:
 - 1. Provide independent soil testing and inspection service for quality control testing during earthwork operations. All testing shall be performed by an independent firm certified in soil testing and who is acceptable to the Owner.

1.3. SUBMITTALS

- A. Name and address of testing service for approval by Owner.
- B. Test reports on excavating, filling and grading:
 - 1. Submit copies of the following reports directly to the Owner from the testing services:
 - a. Test reports on borrow materials and crushed stone.
 - b. One optimum moisture-maximum density curve for each type of soil encountered.
 - c. Field density test reports.

1.4. TESTING

- A. Testing during construction: Testing service must approve fill layers before further construction work is performed thereon.
 - 1. Maximum soil density shall be the density at optimum moisture as determined by ASTM Standard Methods of Test for Moisture-Density Relations of Soil Using 10-lb. hammer and 18-in. Drop, Designation D 1557, using Method A, B, C, or D whichever is applicable.
 - 2. The in-place soil density shall be determined in accordance with ASTM Standard Method of Test for Density of Soil in Place by the Sand-Cone Method, Designation D 1556 or ASTM Standard Method of Test for Density of Soil and

Soil-Aggregate in Place by Nuclear Methods (shallow depth), Designation D-2922.

3. Gradation Analyses shall be performed in accordance with the applicable sections of ASTM D422 Particle-Size Analysis of Soils.
- B. If material has been placed below specified density, based on reports of testing service and inspection, the Contractor shall provide additional compaction and testing at no additional expense to the Owner.

1.5. JOB CONDITIONS

- A. Protection of persons and property:
1. Barricade open excavations occurring as part of this work.
 2. Protect structures, utilities, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

PART 2 PRODUCTS

2.1 STRUCTURAL FILL

- A. New fill placed below and around structural areas (footings, abutments, pavement, etc.) shall be (small) 1.25" Processed Stone aggregate conforming to Connecticut DOT Form 818 M 05.01.

2.1 ORDINARY FILL

- A. New fill placed in non-structural areas shall be Ordinary Fill.
- B. Ordinary Fill shall consist of well-graded soil substantially free of organic materials, loam, wood, trash and other objectionable material which may be compressible or which cannot be compacted properly. Ordinary fill shall be unfrozen and shall not contain snow, ice, or frozen materials. Ordinary fill shall not contain stones larger than eight (8) inches in largest diameter. It shall have physical properties such that it can be readily spread and compacted during filling.
- C. Ordinary Fill may consist of soil excavated from elsewhere on site, subject to approval by the Engineer.

PART 3 EXECUTION

3.1 EXCAVATION

- B. Excavation consists of removal and disposal of materials encountered when establishing required grade elevations.
- C. Perform all excavation of every description and of whatever substances encountered to the depths of extent indicated for the proper installation of the work.
- D. Excavate to the exact depth required for all foundations, structures, and utility systems.
- E. Earth excavation consists of removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in data on subsurface conditions.
- F. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Owner.
1. Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Owner.

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- G. Stability of excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible either because of space restrictions or stability of material excavated.
 - 1. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
 - H. Shoring and bracing: Provide adequate shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.
 - 1. Trench shoring and bracing shall comply with local codes and authorities having jurisdiction.
 - 2. Maintain shoring and bracing in excavations, regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
 - I. Dewatering (Above Tidal Fluctuations): Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
 - 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
 - J. Excavation for structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from foundations to permit placing and removal of concrete formwork, other construction required, and for inspection.
 - 1. In excavating for foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.
 - K. Demolition: Remove any existing concrete foundations, abandoned utility piping, pilings, timber and other debris encountered in areas of construction.
 - L. Excavated materials which meet specification requirements for ordinary fill may be used as ordinary fill. Separate and stockpile suitable excavated materials away from unsuitable materials.
 - M. Cold weather protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.2 COMPACTION

- A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification. Tests of subgrades and fill layers will be taken as follows:
 - 1. Open areas: Make at least one field density test of subgrade for every 4,000 sq. ft. of area, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 4,000 sq. ft. of area, but in no case less than 3 tests.
 - 2. Structural Fill: One test per lift per structure.
- B. Percentage of maximum density requirements: Provide not less than following percentages of maximum density of soil material compacted at optimum moisture content, for the actual density of each layer of soil material-in-place.
 - 1. Ordinary Fill: Compact to 92% of the modified proctor density.

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2. Structural Fill: Compact to 95% of the modified proctor density.
- C. Moisture control:
1. Where subgrade or layer of soil material must be moisture-conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, as needed to obtain optimum moisture content.
 2. Granular material placed within the tidal zone shall be done during low tides and all material shall be leveled and compacted to the required specifications prior to the submergence of the next tide.
 3. 2. Remove and replace or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3.3 BACKFILL AND FILL

- A. General: Place acceptable soil material in maximum 12-inch-thick loose lifts (layers) to required subgrade elevations.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
 1. Acceptance by the Owner of construction below finish grade.
 2. Inspection, testing, approval, and recording locations of underground utilities.
 3. Removal of concrete formwork.
 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Where temporary sheet piling is used cut off sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
 5. Removal of trash and debris.
- C. Ground surface preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills.

3.4 PLACEMENT AND COMPACTION

- A. General: All compacted fill shall be placed in layers unless otherwise specified. Each layer shall be systematically compacted by a minimum of four coverages with the equipment described below, to the density specified herein before. Incidental compaction due to traffic by construction equipment, will not be credited toward the required minimum four coverages.
 6. Compaction equipment in open areas shall consist of vibratory rollers or other compaction equipment approved by the Owner.
 7. Compaction equipment in confined areas (in trenches and adjacent to walls) shall be accomplished by hand-operated vibratory equipment or mechanical tampers as approved by the Owner.
 8. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of a day's operations. Prior to terminating operations for the day, the final layer of fill, after compaction, shall be rolled with a smooth-drummed roller to eliminate ridges of soil left by tractors, trucks and compaction equipment.
 9. The Contractor shall not place a layer of compacted fill on snow, ice or soil that was permitted to freeze prior to compaction. Removal of these unsatisfactory materials will be required as directed by the Owner.
- B. Backfill around/below structural elements: Structural Fill shall be placed in layers having a maximum loose lift (layer) thickness of 8 inches.

3.5 GRADING

- A. General: Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
- B. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.6 DUST CONTROL

- A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of roads/pathways as necessary, so as to minimize the creation and dispersion of dust.

3.7 MAINTENANCE

- A. Protection of graded areas: Protect newly-graded areas from erosion, and keep free of trash and debris. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerances.
- B. Reconditioning compacted areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

3.8 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Remove all waste materials, including unacceptable and/or excess excavated material, trash and debris, from the Owner's property and legally dispose of it.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for EARTHWORK shall be made by the Contract Price Lump Sum (LS) for all the costs including materials, labor, tools, equipment, trucking, survey, supervision, and incidentals necessary to complete the work for all excavation, fill, compaction, grading, and all other work associated with this specification.
- B. Measurement for STRUCTURAL FILL shall be per Contract Unit Price for Compacted Cubic Yard (CCY) of Structural Fill furnished, placed, compacted, and accepted, within limits as directed by the Engineer.

4.2 METHOD OF PAYMENT

- C. Payment for EARTHWORK shall be by the Contract Price Lump Sum for all the costs including materials, labor, tools, equipment, trucking, survey, supervision, and incidentals necessary to complete the work for all excavation, fill, compaction, grading, and all other work associated with this specification and as shown on the Contract Drawings. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection, and supervision for the satisfactory completion of all items under this section.
- A. Payment for STRUCTURAL FILL shall be by the Contract Unit Price per Compacted Cubic Yard of Structural Fill for all the costs including materials, labor, tools, equipment, trucking survey, supervision, and incidentals necessary to complete the work for all Structural Fill placement and compaction in within limits as directed by the Engineer.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
310000-1	Earthwork	LS
310000-2	Structural Fill	CCY

*** END OF SECTION ***

SECTION 31 05 19
GEOTEXTILES

PART 1 GENERAL

- 1.1. WORK INCLUDES
 - A. Placement and use of a geotextile filter fabric to be used as subgrade separation between riprap (or riprap bedding) and existing soil.
- 1.2. RELATED SECTIONS
 - A. Section 313700 – Riprap and Riprap Bedding
 - B. Section 312313 – Subgrade Preparation
- 1.3. SUBMITTALS
 - A. Manufacturer's literature including recommendations for storage, handling and installation.
 - B. Manufacturer's certified test reports and certificates of compliance demonstrating that both the raw materials used in the manufacture of the geosynthetic materials and the final products conform to the requirements specified.
- 1.4. DEFINITIONS
 - A. Geosynthetics – Geotextile filter fabric.
- 1.5. REFERENCES
 - A. The following is a list of standards, which may be referenced in this Section:
 - 1. ASTM International (ASTM):
 - a. D3786 – Standard Test Method for Bursting Strength of Textile Fabrics – Diaphragm Bursting Strength Tester Method.
 - b. D4355 – Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
 - c. D4491 – Standard Test Method for Water Permeability of Geotextiles by Permittivity.
 - d. D4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - e. D4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - f. D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.
 - g. D4884 – Standard Test Method for Strength of Sewn or Thermally Bonded Seams of Geotextiles.
 - h. D5261 – Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
 - B. Connecticut Department of Transportation (CTDOT) Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction, Form 818, 2020.

PART 2 PRODUCTS

2.1 GEOTEXTILE FILTER FABRIC

- A. Mirafi 140N by Mirafi, Inc., or similar as approved by the Engineer.
- B. New products designed and manufactured specifically for the purpose of this Work.
- C. Non-woven polypropylene fabric.
- D. Free from defects or tears, and shall be mildew, insect, and rodent resistant, inert to chemicals commonly found in soil, and resistant to UV light exposure.
- E. Free from any treatment or coating that might adversely alter the hydraulic or physical properties of the material after installation.
- F. Clearly labeled with pertinent quality assurance information including roll number, batch number, type, and date of manufacture.

PART 3 EXECUTION

3.1 STORAGE AND HANDLING

- A. Store and handle geosynthetics per manufacturer's recommendations. Cover geosynthetics with tarps or opaque plastic and shield geosynthetics from prolonged exposure to direct sunlight. Secure geosynthetics with sand bags or straps as necessary to prevent wind damage. Protect geosynthetics from petroleum-based solvents such as gasoline and diesel fuel.
- B. Verify quality assurance data displayed on the labels of materials. Label data must indicate compliance with submitted quality assurance documentation at time of material delivery.

3.2 GEOSYNTHETIC INSTALLATION

- A. Install as shown on the Drawings per manufacturer's recommendations, except where the requirements of these Specifications are more stringent.
- B. Place geosynthetics only on prepared surfaces that are generally free of ruts, large rocks, debris or vegetation, or other deleterious items that may damage the geosynthetic.
- C. Geosynthetic will either be placed and anchored with pins or wrapped and sealed thermally or with pins during construction.
- D. Obtain ENGINEER'S approval prior to use of geotextiles.

3.3 GEOSYNTHETIC JOINTS

- A. Unseamed geotextile joints shall be overlapped a minimum of 18 inches.

3.4 PLACING PRODUCTS OVER GEOSYNTHETIC

- A. Before placing material over geosynthetic, notify ENGINEER. Do not cover installed geosynthetic until after ENGINEER provides authorization to proceed.
- B. If tears, punctures, or other damage occurs during placement of overlying products, remove overlying products as necessary to expose damaged geosynthetic and repair damage to geosynthetic.

3.5 REPAIRING GEOSYNTHETICS

- A. Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged geotextile or geogrid in accordance with manufacturer's recommendations and provide minimum 18 inches overlap in all directions beyond damaged area.

3.6 COMPACTION AROUND GEOSYNTHETICS

- A. Do not operate heavy vehicles or machinery directly on installed geosynthetics. Prevent tracked equipment from turning within 12 inches of buried geosynthetics.
- B. Use small compaction equipment and hand tools as necessary to avoid damage to geosynthetics.

PART 4 MEASUREMENT AND PAYMENT

3.1. METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for work in this Section. Measurement and Payment for this item shall be included within the lump sums for RIPRAP and RIPRAP BEDDING.

*** END OF SECTION ***

**SECTION 31 10 00
SITE CLEARING**

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. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements at the Bulkeley Bridge Overlook.

B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction as indicated on Drawings] and indicated according to requirements in Section 01 56 39 "Temporary Tree and Plant Protection."
- F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled, salvaged or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Topsoil stripping and stockpiling program.

1.6 QUALITY ASSURANCE

- A. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

1.7 FIELD 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 trafficways if required by Owner or authorities having jurisdiction.
- B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where directed by Owner.
- C. Utility Locator Service: Notify Call Before You Dig for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- E. Tree- and Plant-Protection Zones: Protect according to requirements in Section 01 56 39 "Temporary Tree and Plant Protection."
- F. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 00 00 "Earthwork."
 - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

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- B. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #23 (surface-tolerant, anticorrosive metal primer) or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 01 56 39 "Temporary Tree and Plant Protection."
- C. 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 PLANT PROTECTION

- A. Protect trees and plants remaining on-site according to requirements in Section 01 56 39 "Temporary Tree and Plant Protection."
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 01 56 39 "Temporary Tree and Plant Protection."

3.3 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, 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. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade or as necessary to install proposed improvements.
 - 3. Use only hand methods or air spade for grubbing within protection zones.
 - 4. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material 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.

3.4 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
 1. Limit height of topsoil stockpiles to 72 inches.
 2. Do not stockpile topsoil within protection zones.
 3. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.5 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. 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.

PART 4 - MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for SITE CLEARING shall be made by the Contract Price Lump Sum and shall be measured once only for this Contract.

4.2 METHOD OF PAYMENT

- A. Payment for SITE CLEARING shall be by the Contract Price Lump Sum for the site clearing, removal of existing vegetation, clearing and grubbing, stripping and stockpiling of topsoil, and removal and salvaging of existing above- and below-grade improvements indicated as such within the Contract Documents or otherwise as directed by the Owner. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, disposal, storage, handling, protection, and supervision for the satisfactory completion of all items under this section.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
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31 10 00

SITE CLEARING

LS

END OF SECTION

SECTION 31 23 13
SUBGRADE PREPARATION

PART 1 GENERAL

1.1. WORK INCLUDES

- A. Preparing the foundation subgrade and finished excavated surface for placement of geosynthetics, riprap materials, and concrete.
- B. Protection of foundation subgrade until placement of geosynthetics, riprap materials, and concrete.

1.2. RELATED SECTIONS

- A. Section 313700 – Riprap and Riprap Bedding
- B. Section 310519 – Geotextiles
- C. Section 033130 – Reinforced Concrete

1.3. DEFINITIONS

- A. Prepared Foundation – Subgrade surface after completion of foundation preparation activities as specified prior to placement of geosynthetics and riprap materials.
- B. Subgrade – Ground surface after completion of required clearing, grubbing, stripping, and excavation prior to subgrade preparation, placement of geosynthetics and riprap materials.

1.4. QUALITY CONTROL

- A. ENGINEER will conduct visual inspection of the excavated surface before placement of geosynthetics and riprap or concrete. Provide a minimum of 24-hour notice to ENGINEER when final excavation is to be completed for a particular area so that ENGINEER can make arrangements for visual inspection.
- B. Notify ENGINEER immediately when excavation has reached the designated subgrade elevation.
- C. Notify ENGINEER immediately when soft, loose, or wet subgrade zones are detected.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 GENERAL

- A. Perform foundation preparation only when subgrade is unfrozen and free of ice, snow, and standing water.
- B. Perform foundation preparation only during daylight hours.
- C. Keep subgrade free of deleterious materials.
- D. Protect prepared foundation from traffic.

-
- E. Preserve the subgrade below and beyond the lines of excavation in the soundest possible condition. Repair any damage to the subgrade from CONTRACTOR's operations, including disturbance of subgrade beyond the required excavation lines, as approved by ENGINEER.

3.2 PREPARATION

- A. Shape excavation to produce a uniform and regular profile with no abrupt changes in slope, sharp projections, steps, overhangs, or benches except as shown on the Drawings or as approved by ENGINEER.
- B. Excavate to the lines and grades shown on the Drawings.
- C. Protect existing structures from damage during excavation and subgrade preparation.

3.3 PREPARED FOUNDATIONS

- A. Scarify, moisture condition, and compact top 8 inches of subgrade prior to inspection by ENGINEER.
- B. Where subgrade cannot be compacted as specified, or in areas identified by ENGINEER that display yielding or excessive rutting during construction activities, CONTRACTOR shall:
 - 1. Adjust moisture content of the subgrade and recompact.
 - 2. If material to display yielding or excessive rutting, excavate a minimum of 18-inches, or to the top of suitable material as determined by ENGINEER.
- C. Remove exposed soil that is desiccated, frozen, or otherwise disturbed, to the satisfaction of ENGINEER, prior to placing geosynthetics and riprap or concrete.
- D. Maintain prepared foundation in finished condition until geosynthetics and riprap is placed.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made for work in this Section. Measurement and Payment for this item shall be included within the work it is associated with.

*** END OF SECTION ***

SECTION 31 37 00

RIPRAP AND RIPRAP BEDDING

PART 1 GENERAL

- 1.1. WORK INCLUDES
 - A. Hand Placement of riprap and riprap bedding material to the west of the overlook structure as presented on the design drawings.
 - B. Placement of riprap and riprap bedding in other locations as presented on the design drawings or as directed by the ENGINEER.
- 1.2. RELATED SECTIONS
 - A. Section 310519 – Geotextiles
 - B. Section 312313 – Subgrade Preparation
- 1.3. SUBMITTALS
 - A. Description and location of proposed sources of riprap bedding and riprap.
 - B. Certificates of Compliance that riprap and riprap bedding meet the Specification requirements.
 - C. Trip tickets showing source, type, and weight of each load of material delivered to site.
 - D. Certified Test Results documenting material conformance with Specifications as follows.
 1. Gradation.
 2. Abrasion resistance.
 3. Bulk density.
 4. Soundness.
- 1.4. REFERENCES
 - A. The following is a list of standards which may be referenced in this Section:
 1. ASTM International (ASTM):
 - a. ASTM C88, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 - b. ASTM C127 – Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
 - c. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - d. ASTM C535 – Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- 1.5. Connecticut Department of Transportation (CTDOT) Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction, Form 818, 2020.

PART 2 PRODUCTS

2.1 GRAVEL BASE (RIPRAP BEDDING)

- A. Gravel base shall be obtained from off-site sources. Gravel base shall be hard, durable, natural crushed rock, which shall be free of organic matter, debris, and any other deleterious materials.
- B. Gravel base shall conform to Connecticut DOT Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction (Form 818), Section M.01.02-2, No. 3.

2.2 INTERMEDIATE RIPRAP

- B. Intermediate riprap shall conform to Connecticut DOT Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction (Form 818), Section M.12.02-2.
- C. Intermediate riprap shall be an imported material, free from soil, organic matter, debris, and any other deleterious materials.
- D. Intermediate riprap shall be angular and composed of durable rock free from cracks, seams and other defects that would increase its deterioration from water, heat, freezing or other natural causes.

PART 3 EXECUTION

3.1 SCHEDULING AND SEQUENCING

- A. Complete subgrade preparation as specified in Section 312313 – Subgrade Preparation prior to placing riprap bedding and intermediate riprap.

3.2 PLACING GRAVEL BASE (RIPRAP BEDDING)

- A. Place in accordance with lines, grades and thickness shown on the Drawings.
- B. No mechanical compaction of riprap bedding is required.
- C. Work riprap bedding as necessary to distribute it and eliminate detrimental voids. Avoid overworking or long pushes that result in segregation of particle sizes.
- D. Grade surface of riprap bedding free from irregularities and to tolerances of 0.2 foot from established grade.
- E. Place and grade riprap bedding in a manner that avoids subgrade disturbance. Do not push material down slope.

3.3 HAND PLACED RIPRAP

- A. Hand place intermediate riprap over riprap bedding to the lines, grades and thickness shown. Surface of hand placed rip rap shall be consistent with the appearance and uniformity of nearby USACE levee sections
- B. No mechanical compaction of riprap is required.
- C. Intermix different sizes of riprap to eliminate segregation, to interlock pieces, and to fill voids between larger pieces with smaller pieces in such a manner as to form a smooth, uniform, well-graded layer.
- D. Use placement and intermixing methods that avoid disturbing riprap bedding or damaging existing facilities, completed work, or adjacent property.
- E. Placement tolerance for riprap is 0.2 foot above and below established grade such that the established grade is met, on average.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for GRAVEL BASE (RIPRAP BEDDING) shall be made by the Contract Lump Sum Price and shall be measured once only for this Contract.
- B. Measurement for INTERMEDIATE RIPRAP shall be made by the Contract Lump Sum Price and shall be measured once only for this Contract.

4.2 METHOD OF PAYMENT

- A. Payment for GRAVEL BASE (RIPRAP BEDDING) shall be by the Contract Lump Sum Price for the placement of gravel base as such within the Contract Documents. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this section.
- B. Payment for HAND PLACED INTERMEDIATE RIPRAP shall be by the Contract Lump Sum Price for the placement of intermediate riprap as such within the Contract Documents. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this section.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
313700-1	Gravel Base (Riprap Bedding)	LS
313700-2	Intermediate Hand Placed Riprap	LS

*** END OF SECTION ***

SECTION 31 62 19
TIMBER PILES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.2 DESCRIPTION OF WORK

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. Timber Bearing Piles for ADA float support

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Timber under HEAVY TIMBER CONSTRUCTION, SECTION 06 13 00

1.4 QUALITY ASSURANCE

- A. Except as noted, work shall conform to the latest editions of the following codes specifications and standards
 - 1. American Society for Testing and Materials (ASTM), Specifications: D25 Round Timber Piles.
 - 2. American Institute of Timber Construction (AITC).

1.5 SUBMITTALS

- A. Submit for approval by Owner proposals for following items:
 - 1. Driving plan and schedule for installation of piles.
 - 2. Method of installation of piles including size and type of pile hammer.
 - 3. Templates and falsework to be used for support and layout of piles during driving.
- B. AWWA quality stamp on each new treated pile.
- C. Certification of timber pile species.

1.6 PRODUCT HANDLING

- A. Piles shall be handled with care to prevent damage to pile. Damaged piles will be rejected and replaced at no additional cost to the Owner. Piles shall be stored with a space beneath the piles and situated to prevent being exposed to standing water. Cant hooks or pike poles shall not be used.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All timber piles:
 - 1. Piles shall be free from any defects, which will impair their strength, or usefulness for the purpose intended or that will prevent proper driving.
 - 2. All bearing piles shall be of uniform size to permit proper fitting of pile caps, etc.
 - 3. All piling shall be cut from sound and live trees, preferably during the winter season.
 - 4. Estimated length of piles is as shown on the Contract Drawings.
 - 5. Minimum circumference three (3) feet from the butt shall be 38" and minimum tip circumference shall be 22" for piles over 30' in length.
- B. Southern Yellow Pine Bearing Piles:
 - 1. All CCA Treated Piles shall be clean-peeled and treated West coast Douglas Fir or Southern Yellow Pine, meeting ASTM D25-86.
 - 2. Piles shall be free from any defects, which will impair their strength, or usefulness for the purpose intended or that will prevent proper driving.
 - 3. All timber piles shall be treated with chromated copper arsenate (CCA) in accordance with AWWA Standard P5 and C2 for material subject to salt water use and shall obtain a green tint due to the treatment.

PART 3 EXECUTION

3.1 DRIVING EQUIPMENT

- A. Pile hammers: Vibratory, air, steam or diesel-powered, of a type approved by the Owner.
 - 1. Impact Hammers: The hammer furnished shall have a capacity at least equal to the hammer manufacturer's recommendation for the total weight of pile and character of subsurface material to be encountered. The minimum driving energy of the hammer shall be 6500 foot-pounds. For piles of any length, the maximum driving energy of the hammer shall be 10,000 foot-pounds. Diesel-powered hammers shall be operated at the rate recommended by the manufacturer throughout the entire driving period. Sufficient pressure shall be maintained at the hammer so that: (1) for double-acting hammer, the number of blows per minute during and at the completion of driving of a pile is equal approximately to that at which the hammer is rated; (2) for single-acting hammer, there is a full upward stroke of the ram; and (3) for differential-type hammer, there is a slight rise of the hammer base during each upward stroke.
 - 2. Vibratory Hammers: Vibratory hammers will only be allowed to set piles.

- B. Driving helmets and cushion blocks:
1. Use a driving helmet or cap including a cushion block or cap block of a design approved by the Owner between the top of the pile and the ram to prevent impact damage to the pile.
 2. The driving helmet or cap and cushion block combination shall be capable of protecting the head of the pile, minimizing energy absorption, and transmitting hammer energy uniformly and consistently during the entire driving period.
 3. The driving helmet or cap shall fit snugly on the top of the pile so that the energy transmitted to the pile is uniformly distributed over the entire surface of the pile head.
 4. Demonstrate to the Owner that the equipment to be used on the project performs the above functions.
 5. The cushion block may be a solid or laminated softwood block with the grain parallel to the pile axis and enclosed in a close-fitting steel housing. The thickness of block shall be suitable for the length of pile to be driven and the character of subsurface material to be encountered. Generally, thicker blocks are required for longer piles and softer subsurface material.
 6. Replace cushion block if it has been damaged, split, highly compressed, charred or burned or has become spongy or deteriorated in any manner.
 7. Under no circumstances will the use of small wood blocks, wood chips, rope or other material permitting excessive loss of hammer energy be permitted.

3.2 HANDLING

- A. Inspect piles in the leads, and where the protective shell or treated wood is impaired, between cutoff and a point which will be not less than 10 feet below the ground, the piles shall be repaired as specified under Timber Treatment unless the pile is damaged to such an extent that it is rejected. Rejected piles will be replaced at no additional cost to the Owner.
- B. Support pile laterally during driving, but not unduly restrained from rotation in the leads. Where pile orientation is essential, take special care to maintain the orientation during driving. Take special care in supporting battered piles to prevent excess bending stresses in the pile.
- C. When necessary, place collars around the pile head to prevent brooming. Cant hooks shall not be used in handling treated piles. Cut piles by sawing or other means approved by the Owner. Holes for fasteners shall be of a size that will ensure a driving fit.

3.3 DRIVING PILES

- A. All piles shall be driven in the presence of the Owners representative for the last 3 feet of driving.
- B. Timber Bearing Piles:
1. All Bearing Piles shall be driven using an impact hammer
 2. Drive without interruption using an impact hammer to the specified capacity.
 3. **All Bearing Piles shall be driven to a minimum working load of 10 tons.**
 4. **ALL** bearing piles shall be subjected to a pile load test **OR** for bearing piles with specified minimum working loads of 25 tons or less, bearing piles shall be driven for at least the last 12 inches using an impact hammer and the allowable working pile load shall be computed by means of the following pile driving formula using actual recorded blow counts for each pile:

$$R = 2E / (S + C)$$

where:

- R = Allowable pile load in pounds
- E = Energy per blow in foot-pounds
- S = Penetration of last blow or average penetration of last few blows experienced in inches
- C = Constant equal to 1.0 for drop hammer and 0.1 for steam or air hammer

- a. The value of "S" must be determined with the hammer operated at one hundred (100) percent of the rated number of blows per minute for which the hammer is designed.
- b. Any driving resistance developed in strata overlying the bearing material shall be discounted.
- c. If the driving of the pile has been interrupted for more than one (1) hour, the value of "S" shall not be determined until the pile is driven at least an additional twelve (12) inches, except when it encounters refusal.

- C. Tolerances in Driving: Butts shall be within 4 inches of the location indicated. Manipulation of piles to force them into position will not be permitted. Check all piles for heave. Re-drive heaved piles to the required elevation. Piles damaged, mislocated, or driven out of alignment shall be replaced or additional piles driven as directed at no additional cost to the Owner.

3.4 INSTALLATION

- A. All piles shall be marked at a given distance from the pile tip and every foot interval to the pile butt end. Markings should indicate length from the pile tip and should be visible above the waterline or ground level after driving.
- B. If obstructions are encountered, contractor shall make reasonable effort to remove obstruction. Reasonable efforts shall include excavation if obstruction is shallow or probing with steel pile to remove or bypass the obstruction. This work shall be considered as part of the work associated with pile installation
- C. Pile Cut-Offs: After completion of driving, tops of piles shall be cut off to remove damage caused by driving hammer. All cut offs shall be the property of the contractor for removal and disposal from the project site.
- D. Piles that split under driving or prove otherwise unsatisfactory shall be removed and replaced from the site at the sole expense of the Contractor and to the satisfaction of the Owner.
- E. The driving of piles with followers shall not be permitted.
- F. Spudding, jetting, auguring or pre-drilling of piles to achieve the required penetration will not be permitted unless approved in writing by the design engineer.
- G. Any pile, which may be driven in the wrong position, shall be removed and driven in the correct position. Contractor will not be paid for the pile driven in a wrong position.
- H. Any pile which may prove too short after driving, or which has been split, broomed, upset, or otherwise damaged during driving, shall be rejected and another satisfactory pile shall be

substituted and properly driven. The Contractor shall not be paid for pile work associated with the replacement of piles in the above category.

- I. Tops of piles shall be trimmed and shaped as required to connect to other work as shown on the Contract Drawings.

3.5 INSPECTIONS

- A. All piles will be subject to inspection before or after shipment to the site, or both, at the option of the Owner. Any pile that does not conform to all requirements will be rejected.
- B. A line drawn from the center of the butt to the center of the tip must lie wholly within the body of the pile. Any pile that does not meet this requirement shall be rejected.
- C. Inspection of pile driving operations will be provided by the Engineer. No piles shall be driven except in the presence of an authorized inspector.
- D. Approval given by the Owner or by his agent shall not relieve the Contractor of his responsibility for performing the work in accordance with the plans and specifications.
- E. Contractor shall not cut off top of pile until verification by the Owner or by his agent.

3.6 RECORDS

- A. A complete and accurate record of each pile shall be furnished by the Contractor. The presence of the Owner or the Owner's representative will not exempt the Contractor from the requirement to keep and furnish his own records. The record shall indicate the pile location, diameter, length, hammer (make and model), number of blows per 6" for the final 36 inches of penetration, all other pertinent information.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for TIMBER PILES shall be measured by the Contract Unit Price EACH. Measurement shall be the actual number of piles installed as shown on the Contract Drawings.

4.2 METHOD OF PAYMENT

- A. Payment shall be made for the TIMBER PILES at the Contract Unit Price EACH and shall include all compensation for all materials, equipment, labor, transportation, survey, supervision, driving, templates, temporary supports, extraction and re-driving as necessary to ensure required horizontal or vertical tolerances and/or required pile capacity, removal of obstructions, probing, materials including piles, pile shoes, pile attachments, disposal of any surplus material and incidental or appurtenant work, including all cutting, horizontal pile movements, and as may be required to complete the work in accordance with these Specifications and as shown on the Contract Drawings.

2. PAYMENT ITEM

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
31 62 19-01	Timber Piles	EA

*** END OF SECTION ***

SECTION 31 62 23
STEEL PILES

PART 1 GENERAL

1.2 RELATED DOCUMENTS

- A. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.3 SCOPE OF WORK

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. Steel Piles for concrete pier.
 - 2. Debris boom anchor pile.
 - 3. Mooring piles for timber floats.
- C. The Contractor is responsible for furnishing piles of sufficient length to obtain the required capacities. The work includes, but is not limited to, the following:
 - 1. Fabricating and delivering piles.
 - 2. Driving piles in accordance with the latest requirements of the State of Connecticut Building Code.
 - 3. Cutting off piles at the required elevations and disposing of cutoff portions.
 - 4. Filling all pipe piles with concrete.
 - 5. Furnishing and installing reinforcing steel if necessary
- D. Contractor will be responsible for protection and safety of other structures during pile driving operations.

1.4 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Demolition under DEMOLITION, SECTION 02 41 00.
 - 2. Concrete under REINFORCED CONCRETE, SECTION 03 31 30.

1.5 QUALITY ASSURANCE

- A. Except as noted, work shall conform to the latest editions of the following codes specifications and standards
 - 1. American Society for Testing and Materials (ASTM)
 - 2. American Welding Society (AWS)
 - 3. American Institute of Steel Construction (AISC)

4. The State of Connecticut, Department of Transportation "Standard Specifications for Highways and Bridges" (latest edition). (ConnDOT)
- B. Comply with all rules, regulations, laws and ordinances of the State of Connecticut and all other federal, state, and local authorities having jurisdiction. All labor, materials, equipment and services necessary to make work comply with such requirements shall be provided without additional cost to the Owner.
- C. Compliance with all conditions within the Regulatory Approvals.

1.6 SUBMITTALS

- A. Shop Drawings – Submit:
 1. Shop drawings showing design details of piles including, but not limited to, sizes, reinforcing, and other items pertinent to pile fabrication and installation.
- B. Concrete Mix Design - Submit:
 1. Tremie concrete mix design.
- C. Pile Installation Plan – Submit a description of the pile driving procedures, including:
 1. Equipment.
 2. Method of lifting and aligning piles at the correct location including the use of false work and templates.
 3. Details of procedure to tremie fill the piles with concrete.
- D. Manufacturer's Literature – Submit technical and performance literature for:
 1. Pile driving hammer and related equipment, including cap block and cushion.
- E. Installed Pile Data - Submit during the work:
 1. Weekly drawings of as-driven/as-installed pile locations.
 2. Final pile location plan, certified by Registered Land Surveyor or by a Registered Professional Engineer.
 3. Pile installation records for each pile as the work progresses.
- F. Data for piles – Submit during the work:
 1. Results of concrete compressive strength tests.
 2. Mill certificates for all steel pipe provided for piling. Provide certificates, prior to driving, that provide the chemical composition, yield point, and ultimate strength of the steel proposed for use.

1.7 PRODUCT HANDLING

- A. Piles shall be handled with care to prevent damage to pile. Damaged piles will be rejected and replaced at no additional cost to the Owner. Piles shall be stored with a space beneath the piles and situated to prevent being exposed to standing water.

1.8 EXAMINATION OF SITE

- A. Inspect the site personally to evaluate the conditions affecting the work. No claim for additional costs will be allowed because of lack of knowledge of any existing conditions discernible from observation at the site, adjoining properties, and available sources of information. Copies of available drawings of existing on-site structures may be inspected at the office of the Owner.

1.9 LINES AND GRADES

- A. Lay out pile locations and establish all elevations required. Provide and maintain an approved baseline and bench mark located on or close to the work.
- B. Employ, within the Contract Price, a licensed Registered Land Surveyor or a Registered Professional Engineer, familiar with this type of work, who shall establish lines and levels.
- C. Determine the correct location of piles. Keep up-to-date records for the amount of heave of individual piles. Establish actual pile locations. Show locations of the centers of as-driven piles on a drawing in relation to the design location and submit to the Owner within five days after the pile is driven. Include the following on the drawings:
 - 1. Column lines and north arrow.
 - 2. Each pile identified by a separate number.
 - 3. Elevation of top of each pile, prior to cutting, to nearest 0.1 foot.
 - 4. Elevation of tip of each pile to nearest 0.1 foot.
 - 5. Deviation from plan location in inches, measured to nearest 1 inch.
- D. Submit to the Owner within two weeks after the completion of installation of all piles, a plan, certified by the Surveyor, showing the as-installed location of all piles to the nearest ¼ inch.

1.10 OBSERVATION AND TESTING

- A. Full-time inspection of pile installation operations will be performed by the Owners Representative. Drive no piles except in the presence of the Owners Representative.
- B. Cooperate with the Owners Representative to document all pertinent data relative to the installation of piles. The record for each pile shall include:
 - 1. The date and time of installation.
 - 2. Type and size of hammer; pressure and stroke at which operated.
 - 3. Total penetration, shown by point elevation and cutoff elevation.
 - 4. Number of blows for each foot of penetration.
 - 5. Depth of changes in hammer stroke or driving energy during driving.
 - 6. Rate of penetration in blows per inch for the final six (6) inches.
 - 7. Pertinent notes as to unusual behavior of a pile.
- C. Inspection: Owners Representative shall have access to work. Contractor shall make available all materials and equipment necessary at all times for purposes of inspection. Contractor shall cooperate with and assist the Owners Representative inspection. Inspection may include, but is not necessarily limited to:
 - 1. Condition of piles prior to installation.

2. Condition of the hammer prior to driving including:
 - a. Inspection and verification of cap block alignment and thickness.
 - b. Inspection of pile cushion material, thickness and condition.
 - c. Inspection and verification of trip valves and wedge locations and condition of hammer.
 3. Location of piles prior to installation.
 4. Measurement of penetration resistance.
 5. Verification of hammer performance and energy.
 6. Location of piles after installation.
 7. Condition of piles after installation.
- D. Approvals given by the Owner or their Representative shall not relieve the Contractor of responsibility for performing the work in accordance with the plans and specifications.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Steel Pipe Piles:
1. Pier Piles: Pipe piles shall have an outside diameter of the size indicated on the Contract Drawings with a 0.625 inch wall. Pipe shall be seamless or fusion-welded and conform to ASTM A252, Grade 3 for Welded and Seamless Steel Pipe Piles with a minimum yield strength of 50 ksi.
 2. Float Mooring Piles: Pipe piles shall have an outside diameter of the size indicated on the Contract Drawings with a 0.5 inch wall. Pipe shall be seamless or fusion-welded and conform to ASTM A252, Grade 3 for Welded and Seamless Steel Pipe Piles with a minimum yield strength of 50 ksi.
 3. Debris Boom Anchor Pile: Pipe piles shall have an outside diameter of the size indicated on the Contract Drawings with a 0.5 inch wall. Pipe shall be seamless or fusion-welded and conform to ASTM A252, Grade 3 for Welded and Seamless Steel Pipe Piles with a minimum yield strength of 50 ksi.
- B. Piles Splices:
1. Piles may have up to 1 splice located at least 10 feet below the mudline.
- C. Pile Infill: All piles shall be concrete filled in accordance with Section 03 31 30, Reinforced Concrete.
1. Concrete fill for piles shall have a mix design suitable for tremie placement methods, in accordance with Section 03 31 30, Reinforced Concrete.

PART 3 EXECUTION

3.1 DRIVING AND DRILLING EQUIPMENT

- A. Install piles with approved modern equipment.

-
- B. Fix the leads of the pile driving rig at two points. The points shall be at least half the length of the pile apart to maintain the pile and hammer in axial alignment at the correct plan location during the entire driving operation. The leads shall extend down to the lowest point at which the hammer must operate.
 - C. Provide a cap block in the hammer as recommended by the manufacturer and modeled in the wave equation analyses. Replace the cap block when worn or as directed by the Engineer.
 - D. Pile Hammers: Vibratory hammer or air, steam or diesel-powered, of a type approved by the Engineer.
 - 1. Impact Hammers: The hammer furnished shall have a capacity at least equal to the hammer manufacturer's recommendation for the total weight of pile and character of subsurface material to be encountered. The minimum driving energy of the hammer shall be 15,000 foot-pounds. For piles of any length, the maximum driving energy of the hammer shall be operated at the rate recommended by the manufacturer throughout the entire driving period. Sufficient pressure shall be maintained at the hammer so that: (1) for double-acting hammer, the number of blows per minute during and at the completion of driving of a pile is equal to at least 90% of that at which the hammer is rated; (2) for single-acting hammer, there is a full upward stroke of the ram; and (3) for differential-type hammer, there is a slight rise of the hammer base during each upward stroke.
 - a. Pile driving can be performed using a vibratory hammer where practicable i.e. mooring piles.

3.2 HANDLING

- A. Inspect piles, and where the protective shell is impaired, the piles shall be repaired unless the pile is damaged to such extent that it is rejected. Rejected piles will be replaced at no additional cost to the Owner. Support pile laterally during lifting and driving, but not unduly restrained from rotation in the leads. Where pile orientation is essential, take special care to maintain the orientation during driving and drilling.
- B. Support pile laterally during driving, but not unduly restrained from rotation in the leads. Where pile orientation is essential, take special care to maintain the orientation during driving. Take special care in supporting battered piles to prevent excess bending stresses in the pile.

3.3 DRIVING PILES

- A. All piles shall be driven in the presence of the Owners representative for the last 3 feet of driving.
- B. Concrete Pier Friction Piles:
 - i. Friction Piles can be driven using a vibratory hammer
 - ii. Drive without interruption to the specified tip elevation.
 - iii. **All Piles shall be driven to a minimum tip elevation as indicated in drawings.**

3.4 PILE INSTALLATION

- A. Before installation, mark and number each pile in 5-foot intervals along its entire length. In addition, provide marks at 1-foot intervals for the top 30 feet of the pile.
- B. Install all piles at the proper locations shown on the Drawings. Check pile locations during installation and take appropriate corrective measures if the pile moves off location during installation as specified below. Advise the Owner immediately when this becomes necessary.
- C. When impact hammers must be used for steel pile installation, wooden cushions shall be used between the impact hammers and steel pilings.
- D. Drive piles continuously and without interruption for at least the final 5 feet of penetration. If driving should be interrupted before final penetration is reached, the record of the penetration shall not be considered representative until after at least a 12-inch penetration has been obtained after the resumption of driving, except as otherwise directed by the Owner.
- E. Pile support: All piles shall be supported by using either a two-level template with the top level close to the pile cut-off elevation and the lower level approximately 15 feet below or by the use of fixed lead or by a method approved by the Engineer.
- F. Contractor shall notify Owner 48 hours prior to pile installation and no piles shall be installed to final position without the presence of the Owner's Representative.
- G. Provide a vertical reference stake, at least 2 feet long and marked clearly in inches, which can be used to measure the penetration of the pile with each blow as the pile is driven. Support the stake firmly against a fixed object no more than 5 feet away from the pile.
- H. Maximum permissible driving resistance limits to avoid pile damage will be determined based on wave equation analysis of the actual hammer/cap block/cushion/pile system proposed by the Contractor. Stop pile driving if the driving resistance exceeds these limits.
- I. Immediately after a pile is installed, establish a reference point on the pile and measure its elevation on the pile for the purpose of checking heave of the pile tip. After all piles within a radius of 20 feet have been installed, determine the elevation of the reference point on the pile. If uplift of $\frac{1}{2}$ inch or more has occurred, redrive the pile to its original elevation, and deeper if necessary, to the required final driving resistance. After redriving each pile, reestablish the elevation of the reference point. Redrive as often as necessary until the measured uplift on any pile is less than $\frac{1}{2}$ inch. Also, check for pile heave after cleaning out the pile.
- J. Drive no piles within 20 feet of concrete-filled pipe, less than three days old.
- K. There shall be no more than 12 hours of impact pile driving within a 24-hour period.

3.5 OBSTRUCTIONS

- A. If pile driving is stopped due to an obstruction above the presumed tip elevation, notify the Owner immediately.
- B. Where obstructions make it impossible to install certain piles to the required depth, as indicated on contract drawings, at the correct location, attempt to remove or clear the obstruction by excavation. Excavation to a depth of 10 feet below existing ground surface to remove obstructions shall be at the Contractor's expense. If the Engineer determines that obstructions should be removed by excavation to a depth greater than 10 feet, the Contractor will be reimbursed for the additional work. If the Engineer determines that additional piles are required, in lieu of excavation, the Contractor will be reimbursed for the additional piles with predrilling ordered by the Engineer.
- C. Fill any holes left by pulled piles with sand.

3.6 RECORDS

- A. Keep a record, independent of that which may be made by the Owner, of all pertinent data relative to the installation of piles. This record shall be available for the Owner's representative, being transmitted to them as they may direct. The record for each pile shall include:
 - 1. The date and time of installation.
 - 2. Kind and size of hammer; pressure and speed at which operated.
 - 3. Total penetration, shown by point elevation and cutoff elevation.
 - 4. Number of blows for each foot of penetration.
 - 5. Rate of penetration in blows per inch for the final 6 inches.
 - 6. Pertinent notes as to unusual behavior of a pile.

3.7 DEFECTIVE, DAMAGED, AND MIS-DRIVEN PILES

- A. Piles damaged due to internal defects or improper driving or lack of strength will not be accepted. Such defective and damaged piles, as well as piles driven out of proper location or in excess of the tolerances specified, shall be replaced at no additional cost to the Owner.
- B. At the option of the Owner, measures for correcting any deficient pile shall consist of one of the following without any additional compensation.
 - 1. Completely removing the defective pile and installing a new pile.
 - 2. Abandoning the defective pile and installing additional piles. The abandoned piles shall be cut a minimum of 2 feet below the mudline.
 - 3. Modification of pile caps.
 - 4. Load redistribution.

3.8 PILE SPLICES

- A. When required, splice pipe by continuous full penetration butt-joint, single bevel arc weld around the circumference to produce watertight joints developing 100% of the pile strength in tension and compression and bending. A backup ring, with a crimp or pin to

separate the pipe sections, and of a type approved by the Owner shall be used for all splices. All welds shall conform to AWS D1.1 Structural Welding Code and all electrodes shall be E70XX.

- B. Pipe piles may be spliced in the leads. Secure the sections of piles to be spliced in proper alignment such that there is no eccentricity between the axis of the two spliced lengths, or angle between them, after the splice has been completed.
- C. Mechanical drive-fit splices will not be accepted.

3.9 TOLERANCES AND CRITERIA FOR ACCEPTANCE

- A. Concrete-filled Pipe Piles:
 - 1. Install piles as close as practicable to the plan location.
 - 2. A maximum horizontal deviation from the correct location at cutoff elevation equal to 2 inches will be permitted.
 - 3. A maximum deviation from design cutoff elevation equal to 1.0 inch will be permitted.
 - 4. Pulling piles into position will not be permitted.
 - 5. When otherwise acceptably installed piles exceed the specified tolerances and are subject to eccentric loading, the Owner will then analytically determine the total loads on individual piles. If the load on any pile exceeds 110% of the specified load capacity, make corrections in accordance with a design provided by the Owner at no additional cost to the Owner. The cost of analysis and redesign of the pile cap, and if needed, the addition of any additional piles shall be charged to the Contractor.
 - 6. Distortion of the pile diameter at any depth shall not vary more than 20 percent from its original dimensions.
 - 7. The tip of the pile shall not deviate more than 2 percent of the length of the pile from the vertical design alignment.

3.10 CUTTING OFF PILES

- A. Cut off the tops of all piles square within 1 inch of the elevations shown on the Drawings. The pile cutoffs shall become the property of the Contractor and shall be removed from the site.

3.11 CONCRETING

- A. Fill no piles with concrete until all piles within a radius of 20 feet have been accepted by the Owner.
- B. Place concrete in the pile using tremie methods. Place concrete in each pile in a continuous process and in a manner which will result in complete filling of the pile with a minimum of segregation. Use an internal vibrator in the upper 20 feet of concrete in each pile.
- C. Fill no pile except in the presence of the Owners Representative who will observe and record the placing of the concrete.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for PIER PILES shall be measured by the Contract Unit Price EACH.
- B. Measurement for MOORING PILES shall be measured by the Contract Unit Price EACH.
- C. Measurement for ANCHOR PILE shall be measured by the Contract Unit Price EACH .

4.2 METHOD OF PAYMENT

- A. Payment shall be made for the PIER PILES at the Contract Unit Price EACH and shall include all compensation for all materials, equipment, labor, transportation, survey, supervision, driving, templates, temporary supports, extraction and re-driving as necessary to ensure required horizontal or vertical tolerances and/or required pile capacity, removal of obstructions, probing, materials including piles, reinforcing steel, concrete fill, disposal of any surplus material and incidental or appurtenant work, including all cutting, horizontal pile movements, and as may be required to complete the work in accordance with these Specifications and as shown on the Contract Drawings.
- B. Payment shall be made for the MOORING PILES at the Contract Unit Price EACH and shall include all compensation for all materials, equipment, labor, transportation, survey, supervision, driving, templates, temporary supports, extraction and re-driving as necessary to ensure required horizontal or vertical tolerances and/or required tip elevation, removal of obstructions, probing, materials including piles, concrete fill, disposal of any surplus material and incidental or appurtenant work, including all cutting, horizontal pile movements, and as may be required to complete the work in accordance with these Specifications and as shown on the Contract Drawings.
- C. Payment shall be made for ANCHOR PILE at the Contract Unit Price EACH and shall include all compensation for all materials, equipment, labor, transportation, survey, supervision, driving, templates, temporary supports, extraction and re-driving as necessary to ensure required horizontal or vertical tolerances and/or required tip elevation, removal of obstructions, probing, materials including piles, concrete fill, disposal of any surplus material and incidental or appurtenant work, including all cutting, horizontal pile movements, and as may be required to complete the work in accordance with these Specifications and as shown on the Contract Drawings.

4.3 PAYMENT ITEM

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
31 62 23-01	Pier Piles	EA
31 62 23-02	Mooring Piles	EA
31 62 23-03	Anchor Pile	EA

*** END OF SECTION ***

**SECTION 32 01 30
MAINTENANCE OF EXTERIOR IMPROVEMENTS**

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. Cleaning of existing precast concrete bollards and cast-in-place concrete curbs, removal of existing joint sealant and backer rods, cleaning and preparation of joints to receive new backer rods and sealant, and installation of new backer rods and sealant.
2. Cleaning of existing pavers and paver joints, the removal, cleaning and resetting of areas of settled pavers, salvaging and cleaning of pavers indicated to be removed, and refilling of paver joints.

1.3 ACTION SUBMITTALS

- A. Work Plan: Submit a detailed work plan describing the cleaning and repair procedures that will be used to complete the work of this Section and as indicated on the Drawings. The work plan shall include means, methods, products, and procedures including, but not limited to, the following:

1. Documentation of existing substrate conditions.
2. Cleaning of existing precast concrete bollards.
3. Cleaning of existing cast-in-place concrete curbs.
4. Removal and replacement of existing joint sealant.
5. Cleaning of existing pavers to remain in place, salvaged and reset.
6. Salvaging and resetting of pavers.
7. Cleaning and replacement of existing paver joints.

- B. Product Data: For each type of product to be used. Include preparation requirements and application instructions.

- C. Samples for Initial Selection: For each type of the following:

1. Joint materials involving color selection.

- D. Samples for Verification:

1. Joint materials.

1.4 QUALITY ASSURANCE

- A. Provide mockups that demonstrate the procedures and materials to be used to complete the work of this Section and to set the quality standards for execution of the

work. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of joint material from a single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 JOINT SEALANT

- A. Compatibility: Provide joint sealants, backer materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Multicomponent, Nonsag, Urethane, Elastomeric Joint Sealant: ASTM C920, Type M, Grade NS, Class 25, for use T.
 - 1. Color: To be selected by Landscape Architect from full range of manufacturer's standard and premium colors.
- C. Joint Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.
- D. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated

2.3 POLYMERIC SAND JOINT

- A. Polymeric Sand: Mix of graded sand and binder, specially formulated for the filling of existing joint widths and suitable for existing base conditions and pavers. Formulated to prevent weed growth and erosion due to wind, rain and freeze thaw cycles.
 - 1. Color: To be selected by the Landscape Architect from full range of manufacturer's standard and premium colors.

PART 3 - EXECUTION

3.1 GENERAL

- A. Work in this Section shall be performed in accordance with the Drawings and manufacturer's written instructions.
- B. Examine areas to be cleaned and repaired to determine best methods to safely and effectively perform work.
- C. In general, use the least aggressive cleaning materials and methods possible to clean substrates and adjacent surfaces. Verify compatibility of cleaning materials and methods with substrates to be treated.

- D. Follow manufacturer's written recommendations for using their products.
- E. Test treatments in a small, inconspicuous area approved by the Owner prior to performing full cleaning and repair operations.
- F. Protect adjacent surfaces from damage and staining during cleaning and repair operations.

3.2 CLEANING OF BOLLARDS, CURBS AND PAVERS

- A. The surface areas designated shall be thoroughly cleaned to remove dirt, staining, efflorescence, graffiti, moss and other surface contaminants.
- B. The specific cleaning solutions, equipment, pressure washing parameters, and other details of the cleaning shall be provided in the Contractor's Work Plan. Cleaning under this activity shall not proceed until approved by the Owner's Representative.
- C. Apply all cleaning agents in accordance with manufacturer's recommended procedures.
- D. Repeat cleaning process until all dirt, stains, efflorescence, graffiti, moss and other contaminants are removed from the surface to the satisfaction of the Owner's Representative.
- E. Care should be taken when cleaning and pressure washing to avoid damaging bollards, curbs, pavers and surrounding surfaces. The contractor shall perform test sections that will be witnessed by the Owner's Representative in order to confirm that the cleaning and pressure washing will not damage the substrates.
- F. Remove and dispose of all debris generated.

3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint sealant manufacturer's written installation instructions for products and applications unless more stringent requirements apply.
- B. Joint Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions.
- C. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- D. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- E. Install joint-sealant backers to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of joint sealant backer materials.
 - 2. Do not stretch, twist, puncture or tear joint sealant backer materials.

3. Remove absorbent joint sealant backer materials that have become wet before sealant application and replace them with dry materials.
 - F. Install joint sealants immediately following backer material installation, using proven techniques that comply with the following.
 1. Place joint sealants so they fully contact joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
 - G. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants in accordance with the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 1. Remove excess joint sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by joint sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - H. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint sealant manufacturers.
 - I. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.
- 3.4 INSTALLATION OF POLYMERIC SAND JOINTS
- A. Spread dry sand and sweep into joints until they are completely filled flush to the top of the pavers. Sweep excess sand from paver surfaces Comply with polymeric sand manufacturer's written installation instructions for installation procedures.
 - B. Repeat joint filling process 30 days later.
 - C. Clean any remaining polymeric sand from paver surfaces and adjacent surfaces.

PART 4 - MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for CLEAN PRECAST BOLLARDS AND CAST-IN-PLACE CURBS shall be made by the Contract Price Lump Sum and shall be measured once only for this Contract.
- B. Measurement for CLEAN AND RESET PAVERS shall be made by the Contract Price Lump Sum and shall be measured once only for this Contract.

4.2 METHOD OF PAYMENT

- A. Payment for CLEAN PRECAST BOLLARDS AND CAST-IN-PLACE CURBS shall be by the Contract Price Lump Sum for the cleaning of the existing precast concrete bollards and cast-in-place concrete curbs, the removal of existing joint

sealants and backer rods, the cleaning and preparation of joints to receive new backer rods and sealants, and the installation of new backer rods and sealant indicated as such within the Contract Documents or otherwise as directed by the Owner. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this Section.

- B. Payment for CLEAN AND RESET PAVERS shall be by the Contract Price Lump Sum for the cleaning of existing pavers and paver joints, the removal, cleaning and resetting of areas of settled pavers, the salvaging and cleaning of pavers to be removed, and the refilling of paver joints indicated as such within the Contract Documents or otherwise as directed by the Owner. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, handling, protection and supervision for the satisfactory completion of all items under this Section.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
32 01 30-1	CLEAN PRECAST BOLLARDS AND CAST-IN-PLACE CONCRETE CURBS	LS
32 01 30-2	CLEAN AND RESET PAVERS	LS

END OF SECTION

SECTION 32 12 00
BITUMINOUS CONCRETE PAVING

PART 1 GENERAL

1.1 WORK INCLUDES

- A. Provide all layout, labor, equipment, materials, tools, transportation, supervision and incidentals necessary for the placement of new bituminous concrete pavement on a prepared base as shown on the Drawings or as directed by the ENGINEER. All work shall be to the lines, grades, and compacted thickness indicated in these Specifications and on the Contract Drawings.

1.2 REFERENCES

- A. State of Connecticut Department of Transportation (CONNDOT), Standard Specifications for Road, Bridges and Incidental Construction, Form 818 or most current edition.
- B. AASHTO M 140 – Standard Specification for Emulsified Asphalt

1.3 SUBMITTALS

- A. The CONTRACTOR shall submit the following items to the ENGINEER for review and approval in accordance with Section 01 33 00: SUBMITTAL PROCEDURES:
1. Submit proposed mix design of each class of mix for review prior to commencement of work.
 2. Material Certificates: Provide copies of material certificates signed by material producer and CONTRACTOR certifying that each material item complies with or exceeds specified requirements.
 3. At least 48 hours prior to paving, the CONTRACTOR shall submit a plan and schedule of the proposed paving operations. The plan and schedule shall contain detailed information on the following: width and direction of each pass, number of trucks and plant location, number of rollers, method of staggering joints, and typical traffic control measures to be utilized (if applicable). The plan and schedule shall be submitted to, and approved by, the ENGINEER prior to the beginning of paving operations.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All work and materials shall conform to the relevant provisions of the CONNDOT Standard Specifications for Roads, Bridges, and Incidental Construction and as specified herein.
- B. Bituminous Concrete Pavement shall conform to the requirements of M.04 of the CONNDOT Standard Specifications.

- C. Tack Coat shall be emulsified asphalt grade RS-1 conforming to the requirements of AASHTO M140. Viscosity determination will not be required for material sampled at the point of delivery.
- D. Bituminous concrete curbing shall consist of machine laid bituminous concrete, constructed on the pavement to the dimensions and details shown on the plans, or as ordered, and in conformity with the specifications. Materials, including tack coat, for this work shall conform to the requirements of Section M.04, Bituminous Class 3.

PART 3 EXECUTION

3.1 GENERAL

- A. Work shall conform to the applicable requirements of Sections 4.06, 8.03, 8.15 and 9.22 of the CONNDOT Standard Specifications and as specified herein.
- B. Subgrade and Existing Surface Preparation.
 - 1. All surfaces to receive pavements shall be examined by the ENGINEER to see that they in proper condition to receive the work specified. The ENGINEER shall review and mark all deteriorated areas to be removed in the field with the CONTRACTOR.
 - 2. At locations where new pavement is to abut existing, the edge of all deteriorated pavements shall be cut back from exposed edges a sufficient distance to form a clean, sharp straight edge. Cut back pavement shall be carefully removed to minimize any disturbance to foundation materials. After this has been performed, cut back existing pavement 12 inches from the edge of existing base. No ragged or irregular edges will be permitted. The exposed surface of the foundation material shall then be rolled with a power tandem roller, weighing 150 to 240 pounds per inch width of tread, wetting the surface as necessary to obtain a firm, even surface. Any depressions or uneven areas shall be re-graded and re-rolled until the surface is smooth and compacted as specified.
- C. Adjusting of Utility Structures
 - 1. Existing-to-remain water, sewer, drainage, and communications structures which are located in proposed roadway areas shall be made to conform to the newly proposed final grade. Work shall be performed in accordance with the requirements of Sections 1.05.06 Coordination with Utilities, and 1.05.07 Coordination of Work by Other Parties, of the CONNDOT Standard Specifications.

3.2 PLACEMENT

- A. The mixtures shall be placed and compacted to provide a smooth and dense surface with a uniform texture. When overtaken by sudden storms, the ENGINEER may permit placement of the bituminous concrete to continue up to the quantity of material that is in transit from the plant.
- B. The mixture shall be placed at a temperature that is within 25°F (15°C) of the approved job mix formula.
- C. Before rolling is started, the mat shall be checked for defects in material or placement. Such defects shall be corrected to the satisfaction of the ENGINEER. Where it is impracticable due

- to physical limitations to operate the paving equipment, the ENGINEER may permit the use of other methods or equipment. Where hand spreading is permitted, the mixture shall be placed by means of suitable shovels and other tools, and in a uniformly loose layer at a depth that will result in a completed pavement having the designed depth. Any deviation from standard crown or section shall be immediately remedied by placing additional material or removing surplus as directed by the ENGINEER. The ENGINEER may direct that other means of spreading be used to ensure a better control of the depths of material and the finished surface.
- D. A thin uniform coating of tack coat shall be applied to the pavement immediately before overlaying and be allowed sufficient time to break (set). All surfaces that have been in place longer than five calendar days shall have an application of tack coat. A tack coat shall be applied to all contact surfaces such as gutters, manholes and concrete barriers. The tack coat shall be applied by a non-gravity pressurized spray system that results in uniform overlapping coverage at an application rate of 0.05 to 0.15 gallons per square yard (140 to 450 milliliters per square meter). Gravity-fed systems are not acceptable for tack coat application. The ENGINEER must approve the equipment and the method of measurement prior to use. The material for tack coat shall not be heated in excess of 160°F (70°C) and shall not be further diluted.
 - E. Refueling of equipment is prohibited in any location on the paving project where fuel might come in contact with bituminous concrete mixtures already placed or to be placed. Solvents for use in cleaning mechanical equipment or hand tools shall be stored clear of areas paved or to be paved. Before any such equipment and tools are cleaned, they shall be moved off the paved or to-be-paved area; and they shall not be returned for use until after they have been allowed to dry.
 - F. Temporary and permanent transverse joints shall be formed by saw-cutting a sufficient distance back from the previous run, existing bituminous concrete pavement, or bituminous concrete driveways to expose the full depth of the course. On any cold joint, immediately prior to additional bituminous concrete materials being placed, a brush of tack coat shall be used on all contact surfaces.
 - G. The longitudinal joint shall be made with a Notch Wedge as detailed on the Drawings.

3.3 COMPACTION

- A. Compaction: In general, rolling shall consist of initial or breakdown rolling, intermediate rolling and final or finish rolling. The CONTRACTOR shall furnish a sufficient number and type(s) of rollers for each paving machine to properly compact the mat. When operating the roller in the vibratory (dynamic) mode, the operator shall maintain a minimum of ten to twelve impacts per foot (30 to 40 impacts per meter). All vibratory rollers shall be shut off from the vibrating mode when reversing directions and be equipped with automatic reversing eccentrics (weights). The use of a vibratory roller in the dynamic or vibratory mode is prohibited on concrete structures such as bridges and catch basins.
- B. If the ENGINEER determines that the use of vibratory compaction equipment may damage roadway components, utilities or adjacent property, the CONTRACTOR shall provide alternate compaction equipment to meet specification requirements unless otherwise approved by the ENGINEER. The completed pavement course on roadways will have the

mat and longitudinal joints tested for compaction in accordance with the "Density Testing Procedure" established by CONNDOT's Director of Research and Materials. Each course placed at a depth of one and one-half inches (40 mm) or greater shall have the mat and longitudinal joints compacted to a minimum of 92.0 percent and no more than 97.0 percent density as determined by AASHTO T209 (modified). Class 4 bituminous concrete is excluded from the joint density requirements.

3.4 PROTECTION OF THE WORK

- A. All sections of the newly finished pavement shall be protected by the CONTRACTOR from damage by the CONTRACTOR's equipment and traffic.

3.5 CORRECTIVE WORK PROCEDURES

- A. Any portion of the completed pavement determined by the ENGINEER to be defective in surface texture, density or composition, or that does not comply with the requirements of the specifications shall be corrected at the expense of the CONTRACTOR. Any corrective courses placed as the final wearing surface shall not be less than one and one-half inches (40mm) in depth after compaction.

3.6 BITUMINOUS CONCRETE CURB PAVING

- A. The provisions of CONNDOT Section 4.06, and 8.15 shall govern except that the requirements pertaining to density will not apply. In addition, the curbing shall be constructed in accordance with the following requirements:
 1. Prior to the arrival of the mixture on the Project site, the surface of the pavement where the curbing is to be constructed shall be cleaned of all loose and foreign material. The surface, which shall be perfectly dry and clean at the time the mix is placed, shall be coated with an approved tack coat just prior to placing the mixture.
 2. On arrival at the site, the mixture shall be transferred from the truck to the hopper of the curbing machine; and the mixture shall be kept clean and free from dirt and foreign materials at all times.
 3. The surface of the curbing shall be tested with a 10-foot (3-meter) straightedge, and any variation from a true line exceeding 1/4 inch (6 millimeters) shall be satisfactorily corrected at the CONTRACTORS expense. The only compaction required shall be that obtained by the approved mechanical curbing machine.
 4. Where machine work is impractical, the ENGINEER may permit hand-laid curbing to be constructed.
 5. If the design of the curbing machine is such that the outside wheels operate outside of the curb, the CONTRACTOR will be required to obtain a smooth surface by grading and consolidating the area on which the outside wheel of the machine rides, and this work shall be done at the CONTRACTOR's expense.
 6. After the completion of curbing, traffic shall be kept at a safe distance for a period of not less than 24 hours and until the curbing has set sufficiently to prevent injury or damage to the work.

3.7 CONSTRUCTION TOLERANCES AND MATERIAL TYPE

- A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:
1. Binder Course: Plus or minus 1/2 inch.
 2. Surface Course: Plus 1/4 inch, no minus.
- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:
1. Binder Course: 3/8 inch.
 2. Surface Course: 1/4 inch.
- C. Material Type
1. Binder Course : Class I per DOT 818
 2. Surface Course: Class 2 per DOT 818

PART 4 PAYMENT ITEMS

4.1 PAY ITEMS

ITEM	DESCRIPTION	UNIT
321200-1	Bituminous Walkway on New Prepared Base	SF
321200-2	Bituminous Walkway Repair on Existing Base	SF

END OF SECTION

**SECTION 32 33 00
SITE FURNISHINGS**

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. Picnic tables.
 2. Trash receptacles.
 3. Refurbish existing benches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Samples for Initial Selection: For units with factory-applied and field applied finishes.
- D. Samples for Verification: For each type of exposed finish, not less than 6-inch-long linear components and 4-inch-square sheet components.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For site furnishings manufactured with preservative-treated wood.
1. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Work Plan: Submit a detailed work plan describing the repair and refurbishing procedures that will be used to complete the work. The work plan should include the means, methods, products, and procedures including but not limited to:
1. Removal of existing coatings on cast iron components including medallions.
 2. Cleaning and repainting of cast iron components including medallions.
 3. Replacement of wood slats with new wood slats.
 4. Reassembly and reinstallation of refurbished benches.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For site furnishings to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Trash Receptacle Inner Containers: Six full-size units for each size indicated.

1.7 QUALITY ASSURANCE

- A. Provide mockup of refurbished bench to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Mockup shall also demonstrate the cleaning and other surface preparation methods to be used on the existing surfaces in preparation for final coatings.
1. Final approval of color selection will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Owner at no added cost to Owner.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Landscape Architect specifically approves such deviations in writing.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PICNIC TABLES

- A. Provide park standard custom Picnic Table with Accessible Seat as indicated on Drawings and matching existing park picnic tables.
- B. Size and Dimensions: As detailed.
- C. Frame: Steel – A36 hot dipped galvanized to ASTM A123.
- D. Table Top and Benches:
1. Material:
 - a. Wood: Pressure treated Grade #1 Southern Yellow Pine, MCA 0.15 lb./cu. ft. minimum; formed into evenly spaced parallel planks as indicated on Drawings.
- E. Steel Finish: Hot dipped galvanized.
- F. Wood Finish: Transparent finish.
- G. Hardware: A307 hot dipped galvanized to ASTM A153.

2.2 TRASH RECEPTACLES

- A. Provide park standard Northgate Trash Receptacle TWR-15 (Model No. 4ZT4282) as manufactured by TreeTop Products, 222 State Street, Batavia, IL 1-877-230-6755.
1. Size: 32 gallon.
 2. Overall Dimensions: 27" diameter x 39.5" height.
 3. Material: carbon steel weldment.

4. Pattern: 1 3/16" wide x 3/16" thick slats.
5. Door: without side door. Top opening.
6. Lid: Rain Bonnet, with cable.
7. Finish: manufacturer's standard zinc protected powder coating.
8. Color: Black.
9. Liners: Black rigid plastic. Contractor shall drill out 7 holes of one inch diameter in base of each liner for drainage.
10. Mounting: surface mount.
11. Fasteners: stainless steel.

2.3 REFURBISHED EXISTING BENCHES

- A. Refurbish existing cast iron and wood benches originally manufactured by The Bench Manufacturing Co., Concord, MA (Model B-20).
- B. Cast Iron Finish:
 1. Alkyd Prime Coat: Primer, alkyd, anti-corrosive for metal (MPI #79).
 2. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 3. Semigloss Topcoat: Alkyd, exterior semigloss (Gloss Level 5) (MPI #94).
 4. Color: custom color to be selected by Landscape Architect.
- C. Seat and Back: Ipe, provide new wood slats formed into evenly spaced parallel slats, rounded edges.
 1. Size and Dimensions: Match existing.
 2. Finish: Transparent finish.
- D. Fasteners: Stainless steel.

2.4 MATERIALS

- A. Steel and Iron: Free of surface blemishes and complying with the following:
 1. Plates, Shapes, and Bars: ASTM A36/A36M.
 2. Steel Pipe: Standard-weight steel pipe complying with ASTM A53/A53M, or electric-resistance-welded pipe complying with ASTM A135/A135M.
 3. Tubing: Cold-formed steel tubing complying with ASTM A500/A500M.
 4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A513/A513M, or steel tubing fabricated from steel complying with ASTM A1011/A1011M and complying with dimensional tolerances in ASTM A500/A500M; zinc coated internally and externally.
 5. Sheet: Commercial steel sheet complying with ASTM A1011/A1011M.
- B. Wood: Surfaced smooth on four sides with eased edges; kiln dried, free of knots, solid stock of species indicated. Hand select wood for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, incipient decay, honeycomb, knot holes, shake, splits, torn grain and wane.
 1. Wood Species:

-
- a. Pine: Southern yellow pine; No. 1; preservative treated, kiln dried after treatment.
 - b. Ipe: No. 1 Grade, FEQ (First European Quality); clear on four sides with a straight grain, no sapwood, kiln dried.
2. Finish: Manufacturer's standard transparent wood-preservative treatment and sealer.
- C. Anchors, Fasteners, Fittings, and Hardware: Stainless steel; commercial quality, concealed, recessed, and capped or plugged.
 - D. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M; recommended in writing by manufacturer, for exterior applications.
 - E. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.
 - F. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
 1. Hot-Dip Galvanizing: According to ASTM A123/A123M, ASTM A153/A153M, or ASTM A924/A924M.

2.5 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment: Pressure-treat wood according to AWPA U1, Use Category UC3b, and the following:
 1. Use preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 2. Kiln-dry lumber and plywood after treatment to a maximum moisture content, respectively, of 19 and 15 percent. Do not use materials that are warped or do not comply with requirements for untreated materials.

2.6 FABRICATION

- A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.
- B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended, so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.
- C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain

cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

- D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWWA M4 to cut surfaces.
- E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.
- F. Factory Assembly: Factory assemble components to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.7 GENERAL FINISH REQUIREMENTS

- A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 CONCRETE

- A. Concrete for footings: Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities and Incidental Construction Form 818, Section M.03.02, Portland cement concrete with minimum compressive strength of 3,300 psi.

2.9 PROCESSED AGGREGATE STONE BASE

- A. Processed aggregate stone base: Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities and Incidental Construction Form 818, Section M.05.01.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored and positioned at locations indicated on Drawings.

-
- D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Set top of concrete footing below finish grade as indicated on Drawings. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

3.3 REFURBISH EXISTING BENCHES

- A. Remove and dispose of existing wood slats. Salvage cast iron components and medallions for cleaning, repainting, and reinstallation.
- B. Comply with coating manufacturer's written instructions for cleaning and preparing metal surfaces prior to priming and painting.
1. Remove items that are removable and are not to be painted.
- C. Clean metal components of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints, primers and encapsulants.
1. Perform initial cleaning with pressure washer to remove accumulated dirt and debris.
 2. Use a wire brush to remove any loose paint and rust. For any remaining paint, use a paint remover suitable for existing metal substrates.
 3. Sand the metal components to provide a smooth surface prior to applying finishes.
 4. Use clean water and cloths to wipe down metal components and remove any dust and debris.
- D. Prime and paint cleaned and prepared metal components per coating manufacturer's written instructions and recommendations. Use applicators and techniques suited for paint and substrate indicated.
- E. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections.
- F. Cut wood slats to required lengths and seal cut ends. Securely attach wood slats to refurbished metal support frames with stainless steel screws, installed after pre-drilling and countersinking the boards. Set to required levels and lines, with members true to line, cut and fitted.
1. Rout, drill, and round the edges of two slats to receive the refurbished medallions. Medallions shall be centered on the bench as per the original detail.
- G. Reinstall refurbished medallions as per original detail with new stainless steel fasteners.
- H. Reinstall completed refurbished benches as per original detail securely attaching bench to concrete bases.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags and other debris and discarded materials from Project site.

- B. After completing paint applications, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finishes.
- C. Protect work of other trades from damage. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by the Owner, and leave in undamaged condition.

PART 4 - MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for PICNIC TABLES shall be made by the number of PICNIC TABLES furnished, installed, and accepted.
- B. Measurement for TRASH RECEPTACLES shall be made by the number of TRASH RECEPTACLES furnished, installed, and accepted.
- C. Measurement for REFURBISH EXISTING BENCHES shall be made by the number of REFURBISH EXISTING BENCHES refurbished, installed, and accepted.

4.2 METHOD OF PAYMENT

- A. Payment for PICNIC TABLES shall be a unit price for each PICNIC TABLE complete in place which price shall include excavation, backfilling, disposal of surplus materials, and all materials including concrete base, processed aggregate stone base, and all equipment, tools, and labor incidental thereto.
- B. Payment for TRASH RECEPTACLES shall be a unit price for each TRASH RECEPTACLE complete in place which price shall include excavation, backfilling, disposal of surplus materials, and all materials including concrete base, processed aggregate stone base, and all equipment, tools, and labor incidental thereto.
- C. Payment for REFURBISH EXISTING BENCHES shall be a unit price for each REFURBISHED EXISTING BENCH complete in place which price shall include all materials, all equipment, tools, and labor incidental thereto.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
32 33 00-1	PICNIC TABLE	EACH
32 33 00-2	TRASH RECEPTACLE	EACH
32 33 00-3	REFURBISH EXISTING BENCH	EACH

END OF SECTION

SECTION 32 91 15
SOIL PREPARATION (PERFORMANCE SPECIFICATION)

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 furnishing, testing, screening, amending, placing and finish grading all planting soils as shown on the Drawings and specified herein according to performance requirements of the mixes. Provide all planting soil, compost, amendments and fertilizers necessary to properly complete all seeding and planting operations.
- B. Related Requirements:
 - 1. Section 32 92 00 "Turf and Grasses" for placing planting soil for turf and grasses.
 - 2. Section 32 93 00 "Plants" for placing planting soil for plantings.

1.3 DEFINITIONS

- A. AAPFCO: Association of American Plant Food Control Officials.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.
- C. CEC: Cation exchange capacity.
- D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
- E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- F. Imported Soil: Soil that is transported to Project site for use.
- G. Layered Soil Assembly: A designed series of planting soils, layered on each other, that together produce an environment for plant growth.
- H. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
- I. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.
- J. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

- K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- L. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.
- M. SSSA: Soil Science Society of America.
- N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- O. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- P. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- Q. USCC: U.S. Composting Council.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include recommendations for application and use.
 - 2. Include test data substantiating that products comply with requirements.
 - 3. Include sieve analyses for aggregate materials.
 - 4. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:
 - a. Manufacturer's qualified testing agency's certified analysis of standard products.
 - b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
 - c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.
- B. Samples: For each bulk-supplied material, 1-quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For each testing agency.
- B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.
- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on existing, on-site soil and imported soil.

1. Notify Architect seven days in advance of the dates and times when laboratory samples will be taken.

- B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.

1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.8 SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.

- B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Engineer under the direction of the testing agency.

1. Number and Location of Samples: Minimum of three representative soil samples from varied locations for each soil to be used or amended for landscaping purposes.

2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."

3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Owner for its records.

4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.9 TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.

- B. Physical Testing:

1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":

- a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.

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- b. Hydrometer Method: Report percentages of sand, silt, and clay.
 - C. Chemical Testing:
 - 1. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
 - 2. Phytotoxicity: Simple growth test for phytotoxicity, as performed by the Connecticut Agricultural Experiment Station, New Haven, CT.
 - D. Fertility Testing: Soil fertility analysis according to standard laboratory protocol of SSSA NAPT NEC-67, including the following:
 - 1. Percentage of organic matter.
 - 2. Soil reaction (acidity/alkalinity pH value).
 - 3. Nitrogen ppm.
 - 4. Phosphorous ppm.
 - 5. Potassium ppm.
 - 6. Magnesium ppm.
 - 7. Calcium ppm.
 - 8. Soluble-salts ppm.
 - 9. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
 - 10. Other deleterious materials, including their characteristics and content of each.
 - E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3-Chemical Methods."
 - F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
 - 1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. for 6-inchdepth of soil.
 - 2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inchdepth of soil.
- 1.10 DELIVERY, STORAGE, AND HANDLING
- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
 - B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED ACCORDING TO PERFORMANCE REQUIREMENTS

- A. Planting-Soil Type I: Existing, on-site surface soil, with the duff layer, if any, retained; and stockpiled on-site; modified to produce viable planting soil. Using preconstruction soil analyses and materials specified in other articles of this Section, amend existing, on-site surface soil to become planting soil complying with the following requirements:
 1. Particle Size Distribution by USDA Textures: Classified as sandy loam or loam soil according to USDA textures.
 2. Percentage of Organic Matter: Minimum 4 percent to maximum 8 percent by volume.
 3. Soil Reaction: pH of 6 to 7, except for acid loving plants the pH shall be 4.5 to 5.5.
 4. Soluble-Salt Content: Less than 2.0 mmhos/cm saturation media extract.
 5. Fertility: N, P, K, Mg and Ca in amounts recommended by the testing laboratory for the turf types and plant groups to be installed.
 6. RCRA Metals: Below maximum limits established by the Connecticut Department of Energy and Environmental Protection for Direct Exposure Criteria for Soils, Residential Criteria.
 7. Phytotoxicity: Viable planting soil as determined by Phytotoxicity testing.
- B. Planting-Soil Type II: Imported, naturally formed soil from off-site sources and consisting of sandy loam or loam soil according to USDA textures; and modified to produce viable planting soil. Amend imported soil with materials specified in other articles of this Section to become planting soil complying with the following requirements:
 1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.

2. Additional Properties of Imported Soil before Amending: Minimum of 4 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration. Clean soil to be of the following:
 - a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
 - b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 5 percent by dry weight of the imported soil.
 - c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 1 ¼ inches in any dimension.
3. Percentage of Organic Matter: Minimum 4 percent to maximum 8 percent by volume.
4. Soil Reaction: pH of 6 to 7, except for acid loving plants the pH shall be 4.5 to 5.5.
5. Soluble-Salt Content: less than 2.0 mmhos/cm saturation media extract.
6. Fertility: N, P, K, Mg and Ca in amount recommended by the testing laboratory for the turf types and plant groups to be installed.
7. RCRA Metals: Below maximum limits established by CT DEEP for Direct Exposure Criteria for Soil, Residential Criteria.
8. Phytotoxicity: Viable planting soil as determined by Phytotoxicity testing.

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C602, agricultural liming material containing a minimum of 90 percent calcium carbonate equivalent and as follows:
 1. Percent by weight passing through square mesh sieves:
 - a. 100 percent passing No. 10 sieve
 - b. 95 percent passing No. 20 sieve
 - c. 50 percent passing No. 100 sieve
 2. Form: Provide lime in form of ground dolomitic limestone.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C33/C33M.

2.3 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
 - 1. Feedstock: May include biosolids.
 - 2. Reaction: pH of 5.5 to 8.
 - 3. Soluble-Salt Concentration: Less than 4 dS/m.
 - 4. Moisture Content: 35 to 55 percent by weight.
 - 5. Organic-Matter Content: 40 to 60 percent of dry weight.
 - 6. Particle Size: Minimum of 98 percent passing through a 1-inch sieve.
- B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 3.4 to 4.8, and a soluble-salt content measured by electrical conductivity of maximum 5 dS/m.

2.4 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

PART 3 - EXECUTION

3.1 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.
- C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

- A. Excavation: Excavate soil from designated area(s) to a depth of 6 inches and stockpile until amended.
- B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine,

tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

- C. Unsuitable Materials: Clean soil to contain a combined maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.
- D. Screening: Pass unamended soil through a 1 1/4" sieve to remove large materials.

3.3 PLACING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply planting soil on-site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Apply approximately half the thickness of planting soil over prepared, loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
- C. Application: Spread planting soil to total depth indicated on Drawings, but not less than required to meet finish grades after natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
- D. Compaction: Compact each lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D698.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests:
 - 1. Performance Testing: For each amended planting-soil type, demonstrating compliance with specified performance requirements. Perform testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
- C. Soil will be considered defective if it does not pass tests.
- D. Prepare test reports.
- E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.5 PROTECTION

- A. Protection Zone: Identify protection zones according to Section 01 56 39 "Temporary Tree and Plant Protection."
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Vehicle traffic.
 4. Foot traffic.
 5. Erection of sheds or structures.
 6. Impoundment of water.
 7. Excavation or other digging unless otherwise indicated.
- C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Architect and replace contaminated planting soil with new planting soil.

3.6 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

PART 4 - MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for PLANTING SOILS shall be made by the Contract Price Lump Sum and shall be measured once only for this Contract.

4.2 METHOD OF PAYMENT

- A. Payment for PLANTING SOILS shall be by the Contract Price Lump Sum for the furnishing, testing, screening, amending, placing and finish grading of all planting soils as such within the Contract Documents or otherwise as directed by the Owner. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, stockpiling, handling, protection, and supervision for the satisfactory completion of all items under this section.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
32 91 15	PLANTING SOILS	LS

END OF SECTION

**SECTION 32 92 00
TURF AND GRASSES**

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. Providing, installing, establishing and maintaining all lawn turf and native floodplain seed mix areas.
2. Seeding.
3. Hydroseeding.
4. Turf renovation.

B. Related Requirements:

1. Section 32 91 15 "Soil Preparation (Performance Specifications)" for planting soils.
2. Section 32 93 00 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 32 91 15 "Soil Preparation (Performance Specification)" and drawing designations for planting soils.
- E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer.

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- B. Certification of Grass and Native Floodplain Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - C. Product Certificates: For fertilizers, from manufacturer.
 - D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf and native floodplain mix during a calendar year. Submit before expiration of required maintenance periods.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf and native floodplain mix establishment.
 - 1. Experience: Five years' experience in turf installation in addition to requirements in Section 01 40 00 "Quality Requirements."
 - 2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 3. Pesticide Applicator: State licensed, commercial.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk materials with appropriate certificates.

1.8 FIELD CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting acceptance.
 - 1. Spring Planting: April 1 to June 15.
 - 2. Fall Planting: August 15 to October 1.
 - 3. Native Floodplain Mix: As recommended by seed mix supplier, generally between October-May.

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- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.
 - C. Watering: The Contractor shall bear sole responsibility for the furnishing and application of all irrigation water, irrespective of whether or not an irrigation system is installed or operable. The Contractor shall ensure that all irrigation water is applied at the proper frequency, coverage and in the proper amounts to fulfill the plant establishment and maintenance requirements of the Contract. The Contractor's responsibility for all watering shall begin upon delivery of plants to the site and shall continue through the end of the Warranty period.

PART 2 - PRODUCTS

2.1 LAWN SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species:
 - 1. Quality, Certified: Seed of grass species as listed below for solar exposure, with not less than 85 percent germination, not less than 97 percent pure seed, and not more than 0.5 percent weed seed:
 - 2. Sun and Partial Shade, Cool-Season Grass: Proportioned by weight as follows:
 - a. 40 percent: equal proportion of 2 or more improved Kentucky bluegrass (*Poa pratensis*) varieties.
 - b. 40 percent: equal proportion of 2 or more improved creeping red fescue (*Festuca rubra*) varieties.
 - c. 20 percent: 1 or more improved varieties of perennial ryegrass (*Lolium perenne*).

2.2 NATIVE FLOODPLAIN MIX

- A. Seed: with not less than 85 percent germination and not less than 90 percent pure seed.
- B. Native Floodplain Seed Mix: ERNMX-154 Fresh, clean, and dry new seed, of mixed species produced by Ernst Seeds, 8884 Mercer Pike, Meadville, PA 16335, 800-873-3321, or comparable product matching composition below that is acceptable to Landscape Architect:
 - 1. 25.70% *Panicum clandestinum*, Tioga (Deertongue, Tioga)
 - 2. 20.00% *Elymus virginicus* 'Madison' (Virginia Wildrye 'Madison')
 - 3. 15.50% *Andropogon gerardii* 'Niagara' (Big Bluestem 'Niagara')
 - 4. 12.00% *Carex vulpinoidea* (Fox Sedge)
 - 5. 7.00% *Carex lurida* (Lurid Sedge)
 - 6. 5.30% *Carex scoparia* (Blunt Broom Sedge)

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7. 4.00% *Verbena hastata* (Blue Vervain)
 8. 2.00% *Heliopsis helianthoides* (Oxeye Sunflower)
 9. 1.00% *Cinna arundinacea* (Wood Reedgrass)
 10. 1.00% *Asclepias incarnata* (Swamp Milkweed)
 11. 1.00% *Juncus effusus* (Soft Rush)
 12. 0.50% *Eupatorium perfoliatum* (Boneset)
 13. 0.50% *Helenium autumnale* (Common Sneezeweed)
 14. 0.50% *Zizia aurea* (Golden Alexanders)
 15. 0.40% *Aster novae-angliae* (New England Aster)
 16. 0.40% *Aster puniceus* (Purplestem Aster)
 17. 0.40% *Aster umbellatus* (Flat Topped White Aster)
 18. 0.40% *Monarda fistulosa*, Fort Indiantown Gap (Wild Bergamot, Fort Indiantown Gap)
 19. 0.40% *Penthorum sedoides* (Ditch Stonecrop)
 20. 0.40% *Pycnanthemum tenuifolium* (Narrowleaf Mountainmint)
 21. 0.40% *Scirpus cyperinus* (Woolgrass)
 22. 0.30% *Alisma subcordatum* (Mud Plantain)
 23. 0.30% *Lobelia siphilitica* (Great Blue Lobelia)
 24. 0.10% *Solidago rugosa* (Wrinkleleaf Goldenrod)
 25. Grain rye for cover crop

C. Seed Carrier: Inert material, sharp clean sand or perlite.

2.3 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition:

- a. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

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- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

- 1. Composition:

- a. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.4 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

2.5 PESTICIDES

- A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.6 EROSION-CONTROL MATERIALS

- A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.
- B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
 - 1. Verify that seed bed is clean and weed-free.
 - 2. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil according to Section 32 91 15 "Soil Preparation (Performance Specification)."

B. Placing Planting Soil: Place planting soil over exposed subgrade.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.

1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
2. Do not use wet seed or seed that is moldy or otherwise damaged.
3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 5 to 8 lb/1000 sq. ft..

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

3.5 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, commercial fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
 2. Spray-apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1000 lb/acre.

3.6 TURF RENOVATION

- A. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
 2. Install new planting soil as required.
- B. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.
- C. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.
- D. Mow, dethatch, core aerate, and rake existing turf.
- E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.
- H. Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.
1. Soil Amendment(s): according to requirements of Section 32 91 15 "Soil Preparation (Performance Specification)."
 2. Initial Fertilizer: Commercial fertilizer or Slow-release fertilizer applied according to manufacturer's recommendations.
- I. Apply seed and protect with straw mulch as required for new turf.
- J. Water newly planted areas and keep moist until new turf is established.

3.7 TURF MAINTENANCE

- A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.
1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
1. Mow to a height of 2 to 3 inches.
- D. Turf Postfertilization: Apply commercial fertilizer or slow-release fertilizer after initial mowing and when grass is dry.
1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.8 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Landscape Architect:
1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
- B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.9 NATIVE FLOODPLAIN

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
1. Before sowing, mix seed with seed carrier at a ratio recommended by seed supplier.
 2. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 3. Do not use wet seed or seed that is moldy or otherwise damaged.
- B. Sow seed at a total rate of 1 lb./2000 sq. ft with a cover crop of grain rye at 1.5 lbs/2000 sq. ft.. Confirm final seeding rates with seed mix supplier.

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- C. Brush seed into top 1/4 inch of soil, roll lightly, and water with fine spray.
 - D. Protect seeded areas from hot, dry weather or drying winds by applying mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.
 - E. Water newly planted areas and keep moist until native floodplain mix is established.

3.10 NATIVE FLOODPLAIN MAINTENANCE

- A. Maintain and establish native floodplain mix by watering, weeding, mowing, trimming, replanting, and performing other operations as required to establish a healthy, viable meadow. Roll, regrade, and replant bare or eroded areas and remulch. Provide materials and installation the same as those used in the original installation.
 - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and native floodplain mix damaged or lost in areas of subsidence.
 - 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - 3. Apply treatments as required to keep native floodplain mix and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
 - 4. When plantings reach a height of 18 inches, trim to a height of 8 inches. Trimming frequency shall be as needed depending on the height and intensity of weed competition. Do not allow cuttings to cover and smother seedlings.
 - 5. In second growing season, prior to new growth reaching a height of 2 inches, trim any material standing from the previous year to approximately 2 inches height. Continue hand pulling or spot spraying weeds as needed to control invasive vegetation and encroachment of woody or vine species.
- B. Watering: Install and maintain temporary piping, hoses, and meadow-watering equipment to convey water from sources and to keep meadow uniformly moist until the native floodplain mix is fully established.
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.

3.11 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.12 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

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- B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
 - C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
 - D. Remove nondegradable erosion-control measures after grass establishment period.
 - E. Remove temporary irrigation system for plant establishment within 18 months of installation.
- 3.13 MAINTENANCE SERVICE
- A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:
 - 1. Seeded Turf: 90 days from date of planting acceptance, or upon Substantial Completion of the Contract, whichever occurs later. Maintenance Service shall include a minimum of 5 mowings.
 - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.
 - B. Native Floodplain Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Native Floodplain Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable native floodplain area is established, but for not less than maintenance period below.
 - 1. Maintenance Period: 365 days from date of planting acceptance, or upon Substantial Completion of the Contract, whichever occurs later.

PART 4 - MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for LAWN TURF shall be made by the Contract Price Lump Sum and shall be measured once only for this Contract.
- B. Measurement for NATIVE FLOODPLAIN MIX shall be made by the Contract Price Lump Sum and shall be measured once only for this Contract.

4.2 METHOD OF PAYMENT

- A. Payment for LAWN TURF shall be by the Contract Price Lump Sum for fine grading, furnishing, seeding, establishing, mulching, watering, fertilizing, maintaining, and guaranteeing all lawn and turf renovation areas indicated as such within the Contract Documents or otherwise as directed by the Owner. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, disposal, storage, handling, protection, maintenance, and supervision for the satisfactory completion of all items under this section.

- B. Payment for NATIVE FLOODPLAIN MIX shall be by the Contract Price Lump Sum for fine grading, furnishing, seeding, establishing, mulching, watering, fertilizing, maintaining, and guaranteeing all native floodplain seed areas indicated as such within the Contract Documents or otherwise as directed by the Owner. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, disposal, storage, handling, protection, maintenance, and supervision for the satisfactory completion of all items under this section.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
32 92 00-1	LAWN TURF	LS
32 92 00-2	NATIVE FLOODPLAIN MIX	LS

END OF SECTION

**SECTION 32 93 00
PLANTS**

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. Plants, including but not limited to, mulching, fertilizing, maintenance and warranties.
2. Tree stabilization.
3. Tree-watering devices.
4. Beaver protection cages.

B. Related Requirements:

1. Section 01 56 39 "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
2. Section 32 92 00 "Turf and Grasses" for turf (lawn) and meadow planting, hydroseeding, and erosion-control materials.

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- C. Central Leader: A continuation of the main trunk located more or less in the center of the crown, beginning at the lowest main branch (scaffold) and extending to the top of the tree. Also referred to as the Dominant Leader.
- D. Codominant: Two or more vigorous, upright branches or stems of relatively equal size that originate from a common point, usually where the leader was lost or removed.
- E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

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- F. Crown: The portion of the tree beginning at the lowest main (scaffold) branch extending to the top of the tree.
 - G. Finish Grade: Elevation of finished surface of planting soil.
 - H. Included Bark: Bark embedded in the union between a branch and the trunk or between the two or more stems that prevents the formation of a normal branch bark ridge.
 - I. Nursery: A place where young trees and plants are grown commercially for sale. Not included in this definition are horticultural distribution centers and plant re-wholesalers.
 - J. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
 - K. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
 - L. Planting Area: Areas to be planted.
 - M. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 32 91 15 "Soil Preparation (Performance Specification)" for drawing designations for planting soils.
 - N. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
 - O. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
 - P. Scaffold Branches: Large main branches that form the main structure of the crown.
 - Q. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
 - R. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
 - S. Trunk: The main stem of a tree, beginning at the root collar and ending at the lowest main scaffold branch.

1.4 REFERENCE STANDARDS

- A. American Horticulture Industry Association d/b/a AmericanHort. Phone: (614) 487-1117, www.AmericanHort.org.
 - 1. ANSI Z60.1: American Standard for Nursery Stock (current edition).

1.5 COORDINATION

- A. Coordination with Landscape Architect's Site Visits: The Landscape Architect may elect to be present to observe the execution of the work noted below. Provide not less than two full working days advance notice prior to performing these activities. It will be assumed that any work performed without notifying the Landscape Architect of the date and time in advance was performed incompletely or incorrectly.
1. Deliveries of plant materials.
 2. Layout of plant locations.
 3. Preparation of planting area subgrades and placement of planting soil.
 4. Installation of plants.
- B. Coordination with Seeded Areas (Lawns and Other Seed Mixes): Plant trees, shrubs, and other plants after finish grades are established and before planting seeded areas unless otherwise indicated.
1. When planting trees, shrubs, and other plants after planting seeded areas, protect seeded areas, and promptly repair damage caused by planting operations.

1.6 ACTION SUBMITTALS

- A. Nursery Source Tagging Submittals:
1. Nursery Sources: Within 30-days of the Contract start, submit a list of all proposed nursery sources for approval, confirming the availability of plant varieties, sizes, forms, and quantities indicated on the Contract Documents. For field-grown trees and plants, specified as "balled and burlapped," include photographs of the available plant blocks to confirm that the nurseries have a sufficient selection of satisfactory plants available for tagging. Provide the names and telephone numbers for the nurseries' representatives.
 - a. Substitutions: Substitutions of plant material will not be permitted unless approved in writing by the Landscape Architect. If any specified plants are not available at the time when needed to meet the project schedule, submit a statement documenting the nursery sources investigated and providing proposals for equivalent plants to the nearest size or similar variety. Substitutions will not be allowed if the Landscape Architect identifies alternate nursery sources within a 600-mile radius of the project site.
 - b. Container grown plants shall not be substituted for plants designated "B&B" on the Plant Schedule, unless approved in writing by the Landscape Architect.
 - c. Quantities: Quantities shown on the Plant Schedule are for information only. Provide every plant shown on the Drawings. In the event of a discrepancy between Planting Plans and the written quantities in the Plant Schedule, the Planting Plan shall govern.
 2. Planting Schedule: Submit the projected planting schedule, including nursery visits, digging, delivery, storage and installation dates for review and approval. Schedule the dates for each type of landscape work during normal seasons for such work in each area of the site. Correlate with specified maintenance periods to provide maintenance until conclusion of the planting establishment and

maintenance period. Revise schedule to keep current, subject to Landscape Architect's approval.

3. Nursery Visit Schedule: Coordinate with the Landscape Architect and the proposed nurseries to arrange nursery visits. The final schedule for nursery visits shall be submitted no later than the November 30 preceding the scheduled installation of the plants.

B. Product Data: For each type of product.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 10 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

C. Samples for Verification: For each of the following:

1. Organic Mulch: 1-quart volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
 1. Manufacturer's certified analysis of standard products.
 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

D. Sample Warranty: For special warranty.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
 1. Experience: Five years' experience in landscape installation in addition to requirements in Section 01 40 00 "Quality Requirements."

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2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 3. Pesticide Applicator: State licensed, commercial.
- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- D. Plant Material Observation: It is the prerogative of the Landscape Architect to inspect and select all plant material at the grower's nursery prior to digging and upon delivery to the project site for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
1. Plants are subject to inspection and selection for overall form, vigor, and condition by the Landscape Architect with the Installer at the nursery source or place of growth. Plants designated as "balled and burlapped" shall be field grown, and shall not be dug until inspected, approved, and sealed by the Landscape Architect.
 2. The Installer shall accompany the Landscape Architect on all source inspections, and shall make all necessary arrangements, provide transportation, and pay all expenses including travel, food, and lodging.
 3. Coordinate with approved nursery sources and with the Landscape Architect to schedule the Landscape Architect's nursery visits, to secure approved plants, and to confirm digging and shipping dates in conformance with the approved planting schedule. Arrange nursery visits as far in advance of the scheduled installation as possible, which will typically occur during the period running from September through February preceding the installation. In northern and snow-belt nurseries that are expected to be inaccessible during the winter, tagging shall be scheduled for completion prior to the onset of winter conditions. All tagging shall be completed by February 28. Summer and fall digging of deciduous plants will not be permitted without the Landscape Architect's approval.

4. All plants shall be delivered to the site with the Landscape Architect's permanent seals intact.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
- B. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- D. Handle planting stock by root ball.
- E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- F. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation. Remove all wrapping materials upon delivery to the site or while kept in the holding yard.
- G. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 1. Set balled stock on ground and cover ball with mulch or other acceptable material.
 2. Do not remove container-grown stock from containers before time of planting.
 3. Water root systems of plants stored on-site deeply and thoroughly with a drip irrigation system. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.10 FIELD CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

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- B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Preliminary Acceptance.
1. Deciduous Plants: March 1 to May 30, and August 15 until the ground freezes.
 2. Evergreen Plants: April 1 to June 15, and August 15 to October 15.
 3. Perennials and Ornamental Grasses: April 1 to May 30, and September 1 to October 15.
 4. If special conditions exist to justify a variance in the above planting dates, submit a written request to the Landscape Architect stating the special conditions and the proposed variance. Describe techniques in addition to those specified herein that will be employed to prevent dieback and mortality. No waiver of the plant guaranty will be granted for planting performed out-of-season.
- C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- D. Watering: The Installer shall bear sole responsibility for furnishing and applying all irrigation water, irrespective of whether or not an irrigation system is installed or operable. The Installer shall ensure that all irrigation water is applied at the proper frequency, coverage, and in proper amounts to fulfill the plant establishment and maintenance requirements of the Contract. The Installer's responsibility for all watering shall begin upon delivery of plants to the site and shall continue through the end of the Warranty Period.

1.11 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth.
 - b. Structural failures including plantings falling or blowing over.
 - c. Faulty performance of tree stabilization.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 2. Warranty Periods: From date of Preliminary Acceptance of planting or upon Substantial Completion of the contract, whichever occurs later.
 - a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months, except that deciduous plants in a dormant condition on the date the warranty commences will be warranted for an additional period extending through June 1 of the next following spring.

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- b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months, except that deciduous plants in a dormant condition on the date the warranty commences will be warranted for an additional period extending through June 1 of the next following spring.
3. Include the following remedial actions as a minimum:
 - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period. Replace plants that have bark scald, foliage of abnormal density, size and color, or that have more than 25 percent dead or dying branches and branch tips.
 - c. Provide extended warranty for period equal to original warranty period, for replaced plant material.
- 1.12 ACCEPTANCE
- A. The Landscape Architect will inspect all plant material for acceptance upon written request of the Installer. The request shall be received at least 10 calendar days before the anticipated date of inspection.
 - B. Acceptance of plant material will be granted for general conformance to the specified size, character, and quality, but will not relieve the Installer of responsibility for full conformance to the Contract Documents, including correct species.
 - C. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the Landscape Architect, the Landscape Architect will certify in writing that the plant material has been preliminarily accepted.
- 1.13 FINAL INSPECTION AND FINAL ACCEPTANCE
- A. At the end of the Maintenance Period and upon written request of the Installer, the Landscape Architect will inspect all plant material for final acceptance. The request shall be received at least 10 calendar days before the anticipated date of inspection. Upon completion and re-inspection of all repairs and renewals necessary in the judgment of the Landscape Architect at that time, the Landscape Architect will certify in writing that the plant material has received final acceptance.

PART 2 - PRODUCTS.

2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning within the last two years. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
 3. Plants shall have been grown under climatic conditions similar to those of the project site.
 4. Balled and burlapped plants shall be moved as solid units having firm natural balls of soil of sufficient size to encompass the fibrous and feeding root system to ensure full and prompt plant recovery. Plants with loose, manufactured, cracked, broken, or undersized balls will be rejected.
- B. Form and Structure: Unless indicated otherwise in Plant Schedule shown on Drawings, deciduous and evergreen trees shall comply with the following;
1. Habit of growth shall be typical of the species or variety, heavy, symmetrical, well branched and proportioned, and densely foliated when in leaf.
 2. Trees shall have a single, relatively straight vertical trunk and central leader. Deciduous shade trees shall be free of major branches up to a height of at least 6-feet unless otherwise specified. Evergreen and clump-form trees shall have dense compact growth branched to the ground unless otherwise specified.
 3. Trees shall be free of codominant stems and vigorous, upright branches that compete with the central leader. If the original leader has been headed, a new leader at least one-half of the diameter of the original leader shall be present.
 4. Main branches shall be well-distributed along the central leader, and not clustered together. They shall form a balanced crown appropriate for the cultivar or species.
 5. Branch diameter shall be no larger than two-thirds (one-half is preferred) the diameter of the central leader measured 1-inch above the branch.
 6. The attachment of the largest branches (scaffold branches) shall be free of included bark.
- C. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- D. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- E. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.
- F. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

2.2 FERTILIZERS

- A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
1. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
1. Type: Double-shredded bark composed primarily of pine and spruce bark. Aged not less than 9 months.
 2. Color: Natural, un-dyed.

2.4 PESTICIDES

- A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.5 TREE-STABILIZATION MATERIALS

- A. Trunk-Stabilization Materials:
1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
 2. Guys and Tie Wires: ASTM A641/A641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch in diameter.
 3. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
 4. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.
 5. Proprietary Staking-and-Guying Devices: Proprietary stake or anchor and adjustable tie systems to secure each new planting by plant stem; sized as indicated and according to manufacturer's written recommendations.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Foresight Products, LLC: Duckbill Professional Tree Guy System.

2.6 TREE-WATERING DEVICES

A. Slow-Release Watering Device: Standard product manufactured for drip irrigation of plants and emptying its water contents over an extended time period; manufactured from UV-light-stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic.

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. Spectrum Products, Inc.; Treegator.

2.7 MISCELLANEOUS PRODUCTS

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- B. Burlap: Non-synthetic, biodegradable.
- C. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.
- D. Free Draining Material: Sand, gravel, or stone or mixtures thereof, with not more than 70 percent by weight passing the No. 40 mesh sieve and not more than 10 percent by weight passing the No. 200 sieve.
- E. Beaver Protection Cages: 2-inch by 4-inch mesh welded wire fence panels, 36-inches high, 12 gauge galvanized steel or better.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.
 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
 3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 4. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
 - 1. Plant locations on the Drawings are approximate and are to be used only as a guide. Installer shall accurately stakeout plant locations and bed outlines. Do not begin planting excavations until the Landscape Architect has approved or adjusted the stakeouts. Prior to installation, modify plant locations within the project area as directed by the Landscape Architect without additional cost to the Owner.
 - 2. Unless otherwise indicated, massed plantings and rows of shrubs, perennials, and grasses are to be installed in a staggered triangular or diagonal configuration. Straight, square rows will not be accepted.

3.3 PLANTING AREA ESTABLISHMENT

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 32 91 15 "Soil Preparation (Performance Specification)."
- B. Placing Planting Soil: Place prepared planting soil over exposed subgrade.
- C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- D. Application of Mycorrhizal Fungi: Broadcast dry product uniformly over prepared soil at application rate according to manufacturer's written recommendations.

3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits.
 - 1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
 - 2. Excavate approximately three times as wide as ball diameter for balled and burlapped and container-grown stock.
 - 3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
 - 4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.

5. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
 6. Maintain supervision of excavations during working hours.
 7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
- B. Continuous Planting Bed for Shrubs, Perennials and Groundcovers
1. Excavate beds to a minimum depth as indicated on Drawings with sides sloping inward at a 45-degree angle. Loosen subgrade by dragging with teeth of bucket 3-inches to 6-inches deep. Install first lift of planting soil immediately and do not allow loosened subgrade to become compacted.
 2. Install planting soil in two equal lifts. Compact each lift to a minimum of 75 percent and a maximum of 82 percent of Standard Proctor Density. Scarify between lifts by dragging with the teeth of a bucket.
 3. Excavate circular planting pits in continuous beds after planting soil has been installed in continuous bed.
- C. Backfill Soil: Subsoil and topsoil removed from excavations may not be used as backfill soil unless otherwise indicated.
- D. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
1. Hardpan Layer: Drill 6-inch-diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.
- E. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

3.5 TREE, SHRUB, AND VINE PLANTING

- A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.
1. Backfill: Planting soil Type I or Type II.
 2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.

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3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
 - a. Quantity: According to manufacturer's written recommendations.
 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.
1. Backfill: Planting soil Type I or Type II.
 2. Carefully remove root ball from container without damaging root ball or plant.
 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
 - a. Quantity: According to manufacturer's written recommendation.
 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- E. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.
- 3.6 TREE, SHRUB, AND VINE PRUNING
- A. Prune, thin, and shape trees, shrubs, and vines as directed by Landscape Architect.
 1. Remove only dead, dying, or broken branches. Do not prune for shape unless otherwise directed by the Landscape Architect. Make clean cuts as close as possible to the trunk or parent branch without cutting into the branch collar or leaving a stub.
 - B. Do not apply pruning paint to wounds.
- 3.7 TREE STABILIZATION
- A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated on Drawings:
 1. Upright Staking and Tying:

- a. Stake trees up to 5-inch caliper. Use a minimum length required to penetrate at least 12 inches below bottom of backfilled excavation and to extend to the dimension indicated on Drawings above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
 2. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
- B. Trunk Stabilization by Staking and Guying: Install trunk stabilization as follows unless otherwise indicated on Drawings.
1. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.8 GROUND COVER AND PLANT PLANTING

- A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.
- B. Use planting soil Type I or Type II for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.
- E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
 1. Trees and Treelike Shrubs in Turf Areas: Apply organic mulch ring of 3-inch average thickness. Do not place mulch within 6 inches of trunks or stems.
 2. Organic Mulch in Planting Areas: Apply 2-inch average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 6 inches of trunks or stems.

3.10 INSTALLATION OF EDGING

- A. Shovel-Cut Edging: Separate mulched areas from turf areas with a 45-degree, 4- to 6-inch-deep, shovel-cut edge.

3.11 INSTALLATION OF SLOW-RELEASE WATERING DEVICE

- A. Provide one device for each tree.
- B. Place device on top of the mulch at base of tree stem and fill with water according to manufacturer's written instructions.

3.12 INSTALLATION OF BEAVER PROTECTION CAGES

- A. Install beaver protection cages around all new trees. Form a cylinder cage around trunks six time larger than the tree caliper using welded wire mesh panels. Secure ends of panels together to ensure cage remains closed.
- B. Do not affix cages to the trees or ground. Cages should be able to be freely shifted for maintenance.

3.13 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
- D. Provide early spring clean-up of groundcover, perennial and ornamental grass beds before new growth starts. Cut back and remove dead top growth, repair damage, remove weeds, refresh mulch, and re-edge beds.
- E. Protect plants from deer damage, including regularly monitoring deer activity and timely applications of deer repellants and barriers.
- F. Upon Final Acceptance at end of Maintenance Period, remove tree-stabilization devices, slow-release watering devices and planting saucers. Dress with mulch.

3.14 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.15 REPAIR AND REPLACEMENT

- A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Architect.
 - 1. Submit details of proposed pruning and repairs.

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2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.
1. Provide new trees of same size as those being replaced for each tree of 6 inches or smaller in caliper size.
 2. Provide two new tree(s) of 4-inch caliper size for each tree being replaced that measures more than 6 inches in caliper size.
 3. Species of Replacement Trees: Same species being replaced.

3.16 CLEANING AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- D. After installation and before Preliminary Acceptance, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.
 1. Do not remove Landscape Architect's seals. The Landscape Architect will remove the seals during the Final Inspection at the end of the Maintenance Period.

3.17 MAINTENANCE SERVICE

- A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
 1. Maintenance Period: 12 months from date of Preliminary Acceptance or upon Substantial Completion of the contract, whichever occurs later.
- B. Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

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1. Maintenance Period: 12 months from date of Preliminary Acceptance or upon Substantial Completion of the contract, whichever occurs later.

PART 4 - MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for PLANTS shall be made by the Contract Price Lump Sum and shall be measured once only for this Contract.

4.2 METHOD OF PAYMENT

- A. Payment for PLANTS shall be by the Contract Price Lump Sum for furnishing, laying out, installing, mulching, edging, stabilizing, watering, fertilizing, maintaining, and guaranteeing all trees, shrubs, perennials, ornamental grasses, groundcovers and plant beds indicated as such within the Contract Documents or otherwise as directed by the Owner. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, transportation, disposal, storage, handling, protection, maintenance, and supervision for the satisfactory completion of all items under this section.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
32 93 00	PLANTS	LS

END OF SECTION

SECTION 35 51 00
HEAVY TIMBER CONSTRUCTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.2 SCOPE OF WORK

- A. Work under this Section, without limiting the generality thereof, consists of the furnishing and installation of all materials itemized under MATERIALS in this Section, equipment, labor, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:
 - 1. Timber float supports for ADA Access
- B. Should drawings not agree within themselves or the specifications, the greater quantity, or superior quality of work or materials shall be included.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS:

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Timber Fasteners under MISCELLANEOUS METALS, SECTION 05 50 13
 - 2. Timber Treatment under TIMBER TREATMENT, SECTION 06 14 00.

1.4 QUALITY ASSURANCE

- A. Except as noted all work shall conform to the latest editions of the following codes, specifications and standards:
 - 1. Southern Pine Inspection Bureau (SPIB)
 - 2. West Coast Lumber Inspection Bureau (WCLIB)
 - 3. Western Wood Products Association (WWPA)
 - 4. National Forest Products Association (NFPA)
 - 5. American Society for Testing and Materials (ASTM)
 - 6. Connecticut State Building Code (CSBC)
 - 7. American Institute of Timber Construction (AITC)

1.5 SUBMITTALS

- A. Certification of timber species.
- B. Certification of timber treatment

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All timber shall be stored in stacks such that there is an air space beneath the material, and situated to prevent the timber from being exposed to standing water.
- B. The material shall be stored on site in an area which will be designated by the Owner.
- C. Timber shall be handled in an approved manner such that the material will not be damaged.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Unless otherwise specified on the Contract Drawings, all timber to be used shall be No. 2 dense SR Southern Pine as graded by SPIB and with design values per NFPA National Design Specification or the equivalent for Douglas Fir as graded by WCLIB and WWPA.
- B. All timber shall be new and supplied with nominal dimensions unless otherwise noted.
- C. All timber shall be treated with CCA treatment in conformance with TIMBER TREATMENT, SECTION 06 14 00.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prior to installation all demolition affecting the new work shall be completed.

3.2 INSTALLATION

- A. Joints are to be square, tight and well-fastened with all members assembled in accordance with the Contract Drawings.
- B. Bolts shall be tightened to provide a solid connection. No more than 1 washer shall be installed under the bolt head or nut. Bolt threads shall project no more than one bolt diameter beyond the nut.
- C. All timber shall be cut and fit in such a manner as to have full bearing over the entire contact surface.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement for FLOAT SUPPORTS for timber shall be made by LUMP SUM, completed in-place.

4.2 METHOD OF PAYMENT

- A. Payment for FLOAT SUPPORTS for ADA access shall be made by LUMP SUM of completed work in place. This price and payment shall constitute full compensation for the removal of existing supports and the satisfactory installation of all timber complete in place, as identified on the contract drawings, including all labor, removal and storage of existing

timber and hardware, equipment, testing, transportation, survey, supervision, materials, timber treatment, all new hardware, and all other items necessary for the satisfactory installation of the Timber supports, including any incidentals necessary to complete the work specified herein and as shown on the Contract Drawings. Timber piles shall be included within Payment Item 31 62 19-01 Timber Piles

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
35 51 00-01	Float Supports	LS

*** END OF SECTION ***

**SECTION 35 51 13
TIMBER FLOATS**

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.2 SCOPE OF WORK

- A. Scope of work includes, but is not necessarily limited to design, manufacture, supply and installation of the following:
1. Dock Components including
 - a. New Timber Floating Docks
 - b. All repairs and modifications to timber floats including but not limited to new float connections, repaired float connections, pile guides and mooring system
 2. Debris Boom
- B. The Contractor shall supply any and all labor, materials, tools, equipment, trucking, disposal, permits, survey, supervision and any incidentals necessary to complete the work under this Section.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
1. Demolition under DEMOLITION, SECTION 02 41 00
 2. Fasteners, chains, connectors, under MISCELLANEOUS METALS, SECTION 05 50 13
 3. Timber Treatment under TIMBER TREATMENT, SECTION 06 14 00

1.4 QUALITY ASSURANCE

- A. Except as noted, work shall conform to the latest editions of the following codes specifications and standards
1. American Society for Testing and Materials (ASTM)
 2. American Welding Society (AWS)
 3. American Institute of Steel Construction (AISC)
 4. American Institute of Timber Construction (AITC)
 5. American Concrete Institute (ACI)
 6. American Wood-Preservers Association (AWPA)
 7. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction Form 816
- B. Manufacturers of the float system must meet the following requirements
1. Have a minimum of 5 years' experience in the design, production, and installation of commercial timber floating dock systems
 2. Warrant the product for a minimum of two years

3. Life of the product is to be a minimum of 15 years with minor maintenance

1.5 SUBMITTALS

- A. Submit for approval by the Engineer the following items
 1. Examples of previous design/installments of similar systems
 2. Overall plan, cross-section, and details of the proposed system
 3. Material list and specifications
 4. Schedule and method for installation of the system.
 5. Design calculations of all structural components and connections in a clear organized and readable form acceptable to the Engineer, complete with the signature and seal of a Registered Professional Engineer, licensed in the State of Connecticut, responsible for the work. Design calculations shall be comprehensive package including timber floats, concrete floats, connections, guides, pile capacity verification.
 6. Shop drawings: Detailed shop drawings illustrating all structural members and connections for review and acceptance and shall indicate all material thicknesses, dimensions and show in detail all connections for approval prior to fabrication.
- B. Certificates
 1. Certify that all materials are new and meet or exceed specification requirements
 2. Certify that the system meets or exceeds the specified performance requirements
- C. Debris Boom – manufactures specification and shop drawings

1.6 PRODUCT HANDLING

- A. System components shall be handled and stored with care to prevent damage. Damaged members will be rejected and replaced at no additional cost to the Engineer.

PART 2 PRODUCTS

2.1 FLOAT LAYOUT

- A. When combined with the existing aluminum gangway and system connections, the timber floats shall provide a complete safe coordinated system.
- B. The proposed dock and anchoring system are shown on the accompanying drawing(s). Noted are locations and sizes of the gangway(s), connections and timber floating dock(s).

2.2 MATERIALS

- A. Existing floats are manufactured by Custom Float Services, Portland ME. All new floats and connections shall be completely compatible with this system.
- B. Floating Docks: Unless otherwise specified, all timber to be used shall be treated No.1 Dense Southern Pine as graded by SPIB and with design values per NFPA National Design Specification or the equivalent for Douglas Fir as graded by WCLIB and WWPA.
 1. All new southern pine timber members to which the public may be exposed shall be treated with alkaline copper quaternary (ACQ) in accordance with AWPA

- standards for material subject to salt water use and shall obtain a green tint due to the treatment.
2. All other timber members to which the public will not be exposed shall be new and treated with Chromated Copper Arsenate (CCA) in accordance with AWWA standard P5 and U1-UC5A for materials subject to salt water use and shall obtain a green tint due to the treatment.
 3. Decking and exposed visible edges, curbs, etc. shall be a Southern Yellow Pine
 - a. Timber deck shall be edged with a minimum ¼ inch radius or chamfer
 4. All timber shall be new.
 5. No glued laminated timber products will be accepted.
- C. Flotation Units
1. Encasements: All units shall be rotationally molded for seamless, one-piece construction. Nominal wall thickness of 0.15”.
 2. Encasements shall be filled with polystyrene (EPS) beads. The EPS beads are steamed together to provide less water absorption and a solid core for structural strength. Contents shall have a 1.0 to 1.5 pcf density with water absorption not to exceed 3.0 pcf.
- D. Pile guides: New and Existing timber floats shall use chain-type pile guides having the following properties:
1. Minimum 1" clearance around actual pile.
 2. Guides shall be made of steel and meet ASTM A36 and be hot dip galvanized after fabrication
 3. Ultra-High Molecular Weight (UHMW) Polyethylene shall provide wearing surface between float and pile.
 4. All hardware shall be heavy duty, min ½” thickness, suitable for the intended service and appropriate for a waterfront environment.
- E. High Density Polyethylene – UHMW Polyethylene used in any of the float or pile guide appurtenances shall conform to the following
- | | | |
|-----------------|------------|----------------------------|
| Izod Impact | ASTM D256 | 27 ft.-lb/inch (min.) |
| Ult. Tensile | ASTM D638 | 4.5 ksi (min.) |
| Coeff. Friction | ASTM D1894 | 0.20 static/kinetic (max.) |
- F. Normal Fender
1. All berthing faces of float system shall have fender protection or as depicted on project drawings.
 2. Fendering shall be 3.65” polyvinyl fender secured with stainless steel screws as indicated on the Contract Drawings.
 3. Color shall be white.
 4. Fendering shall be attached with lag or expansion bolts with washers spaced as required to prevent tearing separation from float by vessel movements and berthing maneuvers.
- G. All steel utilized within the system shall either be hot-dip galvanized according to ASTM A-123 and A-153 or stainless steel unless specified otherwise.

1. All structural steel components and plates shall be fabricated from ASTM A-36 grade steel or better and shall be hot dip galvanized unless otherwise noted. Minimum steel thickness shall be 3/8".
 2. All corner brackets shall be Heavy Duty with min 1/2" thick steel.
- H. Fasteners
1. All bolts, nuts and washers with a nominal diameter greater than 1/2" shall conform to ASTM 307 and shall be hot dip galvanized unless noted otherwise.
 2. All fasteners with a nominal diameter of 1/2" or less and used in treated timber shall be stainless steel
- I. Stainless Steel
1. All stainless steel shall conform to type 18-8 (300 Series), 304 or 316.
- J. Reinstalled gangway on timber floats shall have aluminum bearing plate (1/8 inch minimum thickness) with sufficient length and width for maximum gangway movement and shall be field attached to float where new gangway or ramp bears on new timber float. Plates shall be secured with countersunk stainless steel screws.
1. Aluminum members shall be grade 6061-T6 with bolted or welded connections.
 2. All bolts or fasteners in contact with aluminum members shall be 316 stainless steel.
- K. Debris Boom shall be TUFFBOOM Standard as manufactured by Worthington Waterway Barriers of East Canton, OH

2.3 PERFORMANCE

- A. Each timber float shall be of non-articulated design and shall function as a unified structure resisting twist and pitch, providing a suppressed conformance to wave forms. The connection between units shall be subject to approval of the Engineer. Modules shall be unsinkable even if structurally damaged. The Contractor shall be responsible for the float meeting the following minimum performance requirements to the approval of the Engineer.
1. Walking surfaces of adjacent floats shall align. A difference in elevation of 1/4 inch or more is unacceptable. Floats shall be +/- 1/8 inch of design dimensions and shall assemble into a unified structure without field trimming or modification.
 2. The contractor shall warranty float materials, accessories, workmanship and performance for one full year from date of final acceptance of float installation.
 3. The pile guides shall be designed to allow removal of the floats from the piles without removal of the piles.

2.4 FLOATING DOCK DESIGN AND LOADING REQUIREMENTS

- A. All floats shall have the following characteristics:
1. Freeboard shall be approximately 21 inches (+/- 1 inch) under all dead loads including gangways, pile guides, fenders, and other permanently attached components.
 2. Length shall be as required to meet layout shown on Contract Drawings.
 3. Widths shall be as defined on contract drawings.

- B. Site Environmental Conditions
1. Site Exposure: Float Manufacturer shall perform their own assessment of exposure conditions including fetch, water depth and wave refraction and reflection conditions as may be required for design. Assumptions shall be included with calculations.
 2. Wind Conditions: Float Manufacturer shall make their own assessment of wind conditions for design of their float system but minimum wind criteria shall be 70mph, 5 sec gust.
 3. Wave Conditions: Float Manufacturer shall make their own assessment of wave conditions for design of their float system but minimum wave criteria shall be as listed below.
- C. Float System shall also be designed to withstand fatigue/torsional loads from wave action.
1. All wave design shall be for H_{10} wave height
- D. The following design loads shall be considered the minimum loads to which the floating docks will be submitted. The floats shall be able to resist these loads in any combination throughout the life of the structure.
1. Vertical loads
 - a. Dead Loads: Include actual weights of all permanent components including gangways, and all other placed and attached parts.
 - b. Uniformly distributed live loads:
 - i. All docks shall be designed structurally for 85psf live load distributed uniformly over the entire timber deck surface
 2. Horizontal Loads
 - a. Wind loads: shall be based on a minimum design 70 mph wind, applied to full profile height of moored vessels and floats.
 - i. Minimum vessel profile height shall be 5 feet
 - b. Wake/Wave loads: The design shall include the wave and wake loading criteria as defined below. The system must also be designed to withstand fatigue/torsional loads from wake/wave action.
 - i. Design wave –Normal Condition – 25 year return period
 1. Wave Height: $H_s = 1.5$ feet, $H_{10} = 2$ feet
 2. Wave Period: 2.0 sec.
 3. Impact Loads
 - a. The installed and connected floating system shall be designed to resist impact berthing-energy of the vessel sizes indicated on the Contract Documents or as normally designed for the slip sizes based on finger length plus 5 feet, applied at an angle of ten degrees to the longitudinal axis of the finger or walkway, at any location that energy might be applied.
 - i. Min vessel criteria shall be:
 1. 20' in length
 2. Berthing speed 1 foot per second
 3. Min weight of 30,000 pounds
 - ii. The installed and connected floating system shall be designed to resist minimum impact berthing-energy of 300 foot pounds, applied at an angle of 45 degrees to the longitudinal axis, at any edge of float location.
 4. Current loads: 4 knots parallel to the long direction of the float only.
 5. All horizontal loadings will be transmitted through the docking system to the anchor system. The anchor system will consist of steel piles and the connection to

the timber floats. These connection points represent a "hard point" in the dock system and must be accounted for in the design.

6. Pile guide and its support shall be designed to the maximum design load, but not less than a working load of 10,000 pounds.

E. Flotation Requirements

1. Dead Loads: Include actual weights of all permanent components including ramps, gangways, utilities, lights and all other placed and attached parts. All floating docks shall have 21 inches of freeboard under dead loads and shall have a level floating dock surface.
2. Uniformly distributed live loads:
 - a. Entire area of timber decking including areas shadowed by gangways: 50 psf
 - b. Gangway uniformly distributed live load: 25 psf
 - c. All floating docks shall have a minimum of eight inches of freeboard under above live loads.
3. Concentrated live load of 400 pounds:
 - a. Concentrated load shall be applied anywhere on the deck including along the edge while maintaining a minimum freeboard of 8 inches at any point.

PART 3 EXECUTION

3.1 INSPECTION

- A. Prior to installing the system, the Owner shall be contacted by the Contractor for inspection of all components.

3.2 INSTALLATION

- A. The system shall be installed, connected and the anchoring system as shown on submitted shop drawings.
- B. Holes for bolts shall be drilled the same size as the bolt before galvanizing. Holes shall be swabbed with 2 coats of sealing compound as specified in TIMBER TREATMENT before installing the bolts.
- C. Debris boom shall be installed per contract drawings and manufacturers recommendation.

3.3 DEFECTIVE WORK

- A. Any damaged portions shall be replaced as directed by the Owner at no additional cost to the Owner.
- B. Any improperly installed components shall be removed and replaced or corrected as directed by the Owner at no additional cost to the Owner.
- C. Failure of system to float level and be stable shall be considered a defect. Contractor shall make the necessary changes to correct the defect at no additional cost to the Owner.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Measurement of TIMBER FLOATS shall be measured by the Contract Unit Price Lump Sum.
- B. Measurement of DEBRIS BOOM shall be measured by the Contract Unit Price Lump Sum

4.2 METHOD OF PAYMENT

- A. Payment shall be made for TIMBER FLOATS at the Contract Unit Price per Lump Sum. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, design, submissions, manufacture, forming, finishing, fendering, pre-assembly, transportation, survey, and supervision for the satisfactory supply and installation of new timber float including but not limited to all connections, cleats, dock fenders, transition plates, hinges, hardware, fasteners, UHMW and any other incidentals necessary to complete the work specified herein and as shown on the Contract Documents.
- B. Payment shall be made for DEBRIS BOOM at the Contract Unit Price per Lump Sum. This price and payment shall constitute full compensation for all labor, equipment, materials, preparation, testing, design, submissions, manufacture, forming, finishing, pre-assembly, transportation, survey, and supervision for the satisfactory supply and installation of new debris boom including but not limited to all connections, wire rope, hardware, fasteners, and any other incidentals necessary to complete the work specified herein and as shown on the Contract Documents.

4.3 PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
35 51 13-01	Timber Floats	LS
35 51 13-02	Debris Boom	LS

*** END OF SECTION ***