SDMS

U.S. Army
Corps of Engineers

New England District
Concord, Massachusetts

FINAL

SPECIFICATIONS FOR THE PHASE 1/PHASE 2 TRANSITION AREA OF THE 1.5-MILE REACH REMOVAL ACTION

DCN: GE-040803-ABNT

April 2003

Site-Specific Environmental Remediation Contract
General Electric (GE)/Housatonic River Project
Pittsfield, Massachusetts

Contract No. DACW33-00-D-0006
Task Order 0005

03P-0582

WESTON SOLUTIONS

SDMS DOC ID 43133

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16 April 2003

Mr. Peter Hugh
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Work Order No. 20125.257.103.1620

Re: Contract No. DACW33-00-D-0006
1.5-Mile Reach Removal Action – Phase 1/Phase 2 Transition Area Design
Final Specifications
DCN: GE-040803-ABNT

Dear Mr. Hugh:

Please find attached four sets of the Final Specifications for the Phase 1/Phase 2 Transition Area of the 1.5-Mile Reach Removal Action at the GE/Housatonic River Site in Pittsfield, Massachusetts. Additional copies of this submittal are being sent simultaneously to the following:

- Dean Tagliaferro, EPA Pittsfield
- Darrell Moore, USACE Pittsfield (3 copies)
- Holly Inglis, EPA Boston

Copies of the drawing set for the Phase 1/Phase 2 Transition Area Design are being sent simultaneously to all the above recipients from WESTON's Manchester, New Hampshire office.

This submittal has undergone WESTON's technical and quality control review and coordination procedures to ensure: (1) completeness for each discipline commensurate with the level of effort required for the submittal; (2) elimination of conflicts, errors, and omissions; (3) compliance with project criteria; and (4) overall professional and technical accuracy of the submittal.

Please feel free to contact me at (978) 779-8904 if you should have any questions.

Very truly yours,

Weston Solutions, Inc.

Tony Lane for

Joel S. Lindsay
Task Manager

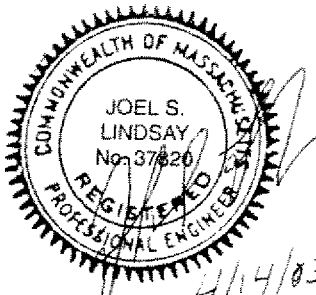
JSL/wp

Enclosure

cc: D. Tagliaferro
D. Moore (3 copies)
H. Inglis
L. dePersia
Sevenson (1 copy)
Woodlot (1 copy)
DCN Files

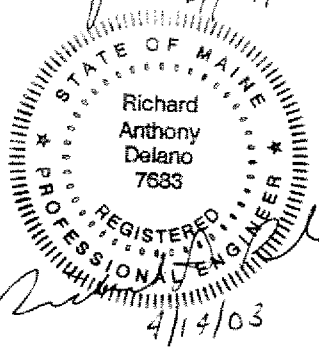
Final Specifications for the Phase1/Phase 2 Transition Area
of the 1.5-Mile Reach Removal Action
Site-Specific Environmental Remediation Contract
General Electric (GE) – Housatonic River Project
Pittsfield, Massachusetts
Stamp Sheet

Specifications Sections: 01010, 01015, 01025, 01080, 01090, 01300, 01330, 01340, 01355, 01410, 01451, 01500, 01562, 02111,02230, 02370, 02371, 02372, 02630, 10100, 11800



4/14/03

Weston Solutions, Inc.
Joel S. Lindsay, P.E.



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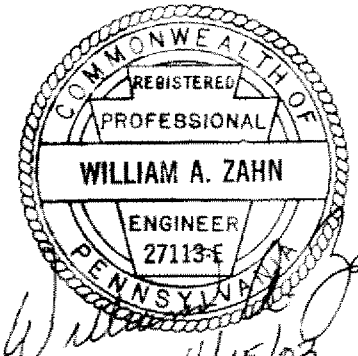
Weston Solutions, Inc.
Richard A. Delano, P.E.

Specifications Sections: 02300, 02360, 02450, 02464, 03100, 03200, 03250, 03300, 03410, 05120, 05520, 05531



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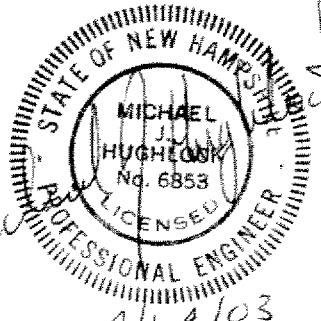
Weston Solutions, Inc.
William A. Zahn, P.E.

Specifications Sections: 11000, 11160, 15064



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Weston Solutions, Inc.
Michael J. Hughlock, P.E.

FINAL

SPECIFICATIONS FOR THE PHASE 1/PHASE 2 TRANSITION AREA OF THE 1.5-MILE REACH REMOVAL ACTION

SITE-SPECIFIC ENVIRONMENTAL REMEDIATION CONTRACT GENERAL ELECTRIC (GE)/HOUSATONIC RIVER PROJECT PITTSFIELD, MASSACHUSETTS

Contract No. DACW33-00-D-0006
Task Order No. 0005
DCN: GE-040803-ABNT

Prepared for

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 Virginia Road
Concord, Massachusetts 01742-2751

Prepared by

WESTON SOLUTIONS, INC.
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April 2003

W. O. No. 20125.257.103.1620

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DIVISION 1—GENERAL REQUIREMENTS

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 SCOPE OF WORK

These drawings and specifications describe a portion of Phase 2 of a Removal Action to be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The work is to be conducted from approximately Station 516+50 to the Elm Street Bridge of the 1.5-Mile Reach of the Housatonic River in Pittsfield, MA, and is referred to as the Phase 1/Phase 2 Transition Area. The general work activities included in the drawings and specifications include site preparation, surveying, monitoring, river diversion, dewatering and water treatment, soil and sediment excavation and disposal, river channel restoration, and site restoration.

The removal action addresses polychlorinated biphenyl (PCB)-contaminated riverbank soil and riverbed sediments that have been determined to exceed allowable risk levels. To accomplish excavation and removal of these materials, a temporary dam will be installed at Station 514+00 to impound the river during relatively low flows.

The river diversion system will consist of a removable stop log dam, and a piping system consisting of 54-inch HDPE pipe, and associated valves, controls, and other appurtenances. The piping and valves are being purchased by the General Contractor and the Excavation Subcontractor under a separate agreement. This work scope includes the installation and operation of these items, along with procurement, installation, and operation of all the other components and appurtenances to the river diversion system, except for the purchase of the steel walkway, rebar and stop logs for the dam.

The temporary dam/piping system, including all necessary equipment and structures will be installed, and operated by the Excavation Subcontractor. The dam and the above equipment will be installed by the Excavation Subcontractor with piping and enclosures as needed. Installation of the dam will occur in the dry utilizing the sheet pile cells extended from Phase 1 of this Removal Action. Cells 11 and 12 of Phase 1, originally terminating at Station 514+00, will be extended downstream by the Excavation Subcontractor the maximum feasible distance so as to maximize project productivity. Half of the dam will be constructed while Cell 11 is dewatered and the other half will be constructed while Cell 12 is dewatered. As the second half of the dam is being completed, the 54-inch HDPE pipe will be fusion welded, maneuvered into place, and anchored in accordance with approved plans. Following connection and anchoring of the pipe, the stop logs will be put in place to stop flow from entering the area to be excavated.

While the dam is in place, the river water upstream of the dam will be diverted into pipes around the downstream work area and returned to the river downstream. Diversion of river

water will be accomplished using gravity flow. In general, each work cell or excavation will be segregated from the river both at the upstream and downstream ends by secondary, movable dams as necessary throughout Phase 2. Once an excavation area is prepared, it will be dewatered and subsequently surveyed, and soil and sediment within the area will be excavated and removed. Because the gravity diversion pipes will rest in the riverbed, half of the riverbed will be completed before it is necessary to move the pipe to the restored portion of the river. In areas where access is limited, earthen berms/ramps will be used to allow equipment to cross the pipes. In general, when river flows exceed or are expected to exceed the capacity of the diversion system, the temporary dam will be removed, excavation will be suspended, and the work areas will be secured and prepared for flooding.

In general, soil and sediment will be excavated to a depth of 2 to 3 feet in layers by disposal category (TSCA or non-TSCA) as noted on the drawings. Specific excavation depths for each area are indicated on the drawings. After excavation and removal is completed within a particular area, the removed soil and sediment will be replaced with appropriate backfill materials and hard structures as necessary, riverbed habitat enhancement structures will be installed as appropriate, and restoration of the banks via replanting and installation of slope reinforcing structures will be conducted. In general, work will proceed sequentially down the river, with each area being successively isolated, remediated, backfilled, and restored. For the work within the Transition Reach, one large cell consisting of separate excavations for each side of the river is anticipated.

1.2 DIVISION OF WORK

The design/build contractor for the work is WESTON. WESTON has formed a team of contractors with differing specialties to accomplish the project. Work tasks are to be divided up on the basis of maximizing efficiency and minimizing cost and risk to the Government. Table 01010-1 provides a breakdown of the major construction work tasks and entities that are expected to conduct them.

Table 01010-1

1.5-Mile Removal Action—Phase 2
Station 514+00 to Elm Street Bridge
Division of Major Work Tasks

Work Task	Executing Party
Out of River Site Preparation	Sevenson (Excavation Subcontractor)
River Diversion System	Sevenson
Soil/Sediment Excavation	Sevenson
Stockpile Area Management	Sevenson
Material Transport from Excavation to Stockpile Area and from Stockpile Area to On-Plant Consolidation Areas (OPCAs)	Sevenson
Water Treatment	Sevenson
Restoration–Revegetation and Hard Structures	Sevenson
Restoration – Plant Installation	WESTON/Planting Subcontractor
Surveying	WESTON
Quality Control	WESTON and all Subcontractors
Site Monitoring	WESTON or Subcontractor

The work division depicted above forms part of the basis for the structure of the drawings and specifications, and in particular, the Measurement and Payment specification section.

1.3 MAJOR WORK TASK DESCRIPTIONS

a. Site Preparation—This activity will include but not be limited to clearing (and grubbing as necessary) for access roads and staging areas, clearing on riverbanks, building of access roads and staging areas/stockpile areas, including truck wash pads and decontamination pads, out-of-river erosion control measures, and coordination and maintenance of traffic control and details. (Excavation Subcontractor – note that some clearing and fence relocation on Parcel I8-24-1 has already been performed by the General Contractor)

b. River Diversion System—This activity will include installation and operation of the removable dam and other associated support equipment and systems for the river diversion system. The temporary dam/piping system will generally be supplied, installed, and operated by the Excavation Subcontractor. Selected items are being

supplied by either the General Contractor or the Excavation Subcontractor under a separate agreement. The dam and the previously mentioned equipment will be installed by the Excavation Subcontractor with piping and enclosures as needed. (Excavation Subcontractor)

c. Soil/Sediment Excavation—This activity will include, but not be limited to, in-river site preparation (including those activities incidental to providing adequate access to the river, e.g., crane pad construction and removal), secondary dam installation and removal (includes on-site handling of removed material), temporary and permanent outfall relocation/redirection as described in the drawings and as necessary, cell dewatering and conveyance of water to the water treatment plant, in-river erosion control measures, soil and sediment excavation and removal and loading into trucks for transport, testing (excluding chemical) and supply of backfill, backfilling excavated areas, placement of bank and riverbed armor and walls, and installation of riverbed habitat enhancement structures. (Excavation Subcontractor)

d. Material Transport from Excavation to Stockpile Area and from Stockpile Area to On-Plant Consolidation Areas (OPCAs) —These activities include, but are not limited to, transport of material from the excavation area (via direct loading from in-river excavating equipment) to stockpile areas, maintenance and management of the stockpile areas, transport of contaminated material from stockpile areas to GE's OPCAs, load-out of material for off-site transport if required, and transport of clean backfill from borrow locations to the river work areas for placement. (Excavation Subcontractor)

e. Water Treatment—This activity includes, but is not limited to, operation and maintenance to treat water pumped from the excavation cells to meet applicable discharge standards, and return of treated water back to the river. Includes installation and maintenance of discharge structure(s) to minimize erosion in accordance with Applicable or Relevant and Appropriate Requirements (ARARs). (Excavation Subcontractor)

f. Restoration (Revegetation and Hard Structures) —This activity includes, but is not limited to, installation of sheet pile retaining wall systems and seeding and erosion control measures for upper bank areas as shown on the drawings and specifications. (Excavation Subcontractor)

g. Restoration (Plant Installation)—This activity includes, but is not limited to, providing, installing, and maintaining all containerized plants and cuttings as required. (General Contractor/Planting Subcontractor)

h. Surveying—This activity includes, but is not limited to, surveying of riverbed and riverbank elevations and locations of relevant structures at several junctures during the construction work. This will include pre-excavation survey of dewatered areas, interim surveys to determine excavated amounts as a basis for payment and respective amounts of TSCA and non-TSCA regulated materials, and final survey after backfilling and restoration. (General Contractor)

i. Site Monitoring—This activity includes, but is not limited to, a number of different types of monitoring activities to be conducted before, during, and post-construction. Includes air monitoring, water column monitoring, vibration monitoring, settlement monitoring, water treatment system testing, all chemical testing of backfill, NAPL impacted material, and other material generated during the work, and conditions monitoring, as described in detail in the specifications. (General Contractor)

END OF SECTION

SECTION 01015

GENERAL CONDUCT OF WORK

PART 1 GENERAL

1.1 REFERENCES

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

CODE OF FEDERAL REGULATIONS

29 CFR 1904	Recording and Reporting Occupational Injuries and Illnesses
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
40 CFR 264, Subpart D	RCRA Contingency Plan and Emergency Procedures
40 CFR 280, Subpart E	Release Reporting, Investigation, and Confirmation
40 CFR 110, 112	Clean Water Act – Spill Prevention Control and Countermeasures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
15 U.S.C. §2601 et seq.	Toxic Substances Control Act

CODE OF MASSACHUSETTS REGULATIONS

310 CMR 40, Subpart C	Massachusetts Contingency Plan – Notification of Releases and Threats of Release of Oil and Hazardous Material
314 CMR 15.00	Massachusetts Rules for the Prevention and Control of Oil Pollution
310 CMR 30.000	Massachusetts Hazardous Waste Regulations
310 CMR 30.520	Massachusetts Hazardous Waste Rules – Contingency Plan, Emergency Procedures, Preparedness, and Prevention

U.S. ARMY CORPS OF ENGINEERS

EM 385-1-1 Safety and Health Requirements Manual

PROJECT PLANNING AND GUIDANCE DOCUMENTS

Final Quality Assurance Project Plan (QAPP), Roy F. Weston, Inc., General Electric/ Housatonic River Project, Volumes I, II, IIA, and IV, Contract No. DACW33-00-D-0006, DCN: GE-021601-AAHM, March 2001.

Final Quality Assurance Project Plan (QAPP), Roy F. Weston, Inc., General Electric/ Housatonic River Project, Volume III, Contract No. DACW33-94-D-0009, DCN: GEP2-123098-AAET, January 1999.

Draft Field Sampling Plan (FSP), Roy F. Weston, Inc., Environmental Remediation Contract General Electric/ Housatonic River Project, Pittsfield, MA, Contract No. DACW33-00-D0006, Task Order No. 0002, DCN: GE-091200-AADI, November 2000.

1.2 PROJECT ROLES

a. The principal parties to be involved in the execution of the project are described below along with a general description of their roles in the project:

Government, Contracting Officer, or Contracting Officer's Representative (Army Corps of Engineers) – Federal Agency responsible for direction and oversight of the SSERC Contract and the 1.5-Mile Removal Action. Government representatives to provide input and direction as indicated in the specifications.

Engineer/General Contractor (Weston Solutions, Inc.) – Contractor with overall responsibility for the design and construction of the 1.5-Mile Removal Action, and direct execution of out-or-river construction tasks as defined in the drawings and specifications. All other contractors mentioned below and in the specifications are subcontractors to the General Contractor.

Excavation Subcontractor (Sevenson Environmental Services, Inc.) – Contractor responsible for execution of in-river construction tasks as defined in the drawings and specifications.

Planting Subcontractor (To Be Determined) – Contractor responsible for all plant installation related to the project.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-11 Closeout Submittals

Record Drawings; G

1.4 HANDLING AND STORAGE

a. The Excavation Subcontractor shall handle, haul, and distribute all materials and all surplus materials for the different portions of the Work, as necessary. Areas available for storage of materials and equipment are shown on the drawings. Within these areas the Excavation Subcontractor shall provide suitable and adequate storage room for materials and equipment during the progress of the Work and be responsible for loss of, or damage to, materials and equipment furnished by him, until the final acceptance of the Work.

b. All excavated materials, construction equipment, materials and equipment to be incorporated in the Work shall be placed so as not to injure the Work and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work.

1.5 WORK ON PUBLIC AND PRIVATE RIGHTS-OF-WAY

a. All rights-of-way for construction and access will be provided by the Government unless otherwise stated elsewhere.

b. Before any work is commenced on public rights-of-way, the General Contractor shall obtain all necessary working permits from the appropriate departments. All work on public rights-of-way shall be performed in conformance with the requirements of the appropriate City of Pittsfield department.

1.6 RESTORATION OF DISTURBED PROPERTY

The Excavation Subcontractor will be responsible for ties to and all elevations of all property disturbed by his forces during the execution of this Contract. The Excavation Subcontractor will also be responsible for recording the ties to the elevations prior to disruption and for reestablishing the disturbed areas accurately and completely to its preconstruction condition or better.

1.7 DAMAGE TO THE WORK

Until the final acceptance of the Work by the Government, it shall be under the care and charge of the General Contractor and he shall take every precaution necessary against injury or damage to the Work by the action of the elements or any other causes whatsoever.

1.8 MOBILIZATION AND DEMOBILIZATION

Initial mobilization to the site has already been conducted under Phase 1. Final demobilization from the site at the end of the project will not be conducted under this contract. Therefore there are no separate pay items included for mobilization or demobilization. During execution of the project, it is possible that an extended shutdown period(s) will be required due to high river flows or other adverse conditions. In such situations, the Excavation Subcontractor may be directed by the General Contractor to temporarily demobilize from the site. Payment for temporary demobilization/remobilization of selected equipment and personnel will be based on a change order prepared by the Excavation Contractor and approved by the General Contractor and the Government for actual demobilization/remobilization costs.

1.9 STAND-BY TIME

Based on historical river flows, and flow capacity of the diversion system, it is expected that the work area will be flooded from time to time and work will be stopped. Prior to the beginning of construction, a lump sum stand by ceiling cost will be negotiated on a per event or per day/week basis for Stand-by for flooding. Stand-by due to flooding and other issues will be paid to the Excavation Subcontractor in accordance with a determination by the General Contractor and the Government of in-river construction equipment and personnel required to go on stand-by. Stand-by time for equipment and/or personnel could be granted in association with the following general conditions/occurrences other than flooding:

- Delay caused by presence of nonaqueous phase liquid (NAPL) that requires further assessment and supplemental remediation activities.

- Obstructions to driving of sheetpiles that require significant revisions to the sheetpile cell configuration and/or sheetpile installation method, and thereby delay the progress of the work.

Payment for stand-by time will only be granted based on direction provided to the Excavation Subcontractor by the General Contractor and the Government to go on stand-by. In obtaining payment for stand-by time, the Excavation Subcontractor will provide to the General Contractor for approval a change order including a list of equipment and personnel placed on stand-by and associated costs.

1.10 MATERIAL BROUGHT ON-SITE

The Excavation Subcontractor shall be bringing clean material on-site for use for staging area pads, access roads, earthen berms and other items. Prior to being brought on site, it will be necessary for this material to be tested by the General Contractor to determine compliance with the limits for TPH, PCBs, VOCs, SVOCs, and Metals. The Excavation Contractor will be required to provide prior justification and description of the use of such material via the plan submittals required by these specifications, and shall be required to minimize the amount of material used to the fullest extent practicable. All on-site handling of this material shall be the responsibility of the Excavation Subcontractor.

1.11 SAFETY PROVISIONS

a. The General Contractor and all of his/her subcontractors (Excavation Subcontractor, Planting Subcontractor, and any other subs) shall be responsible for complying with the Site Specific Health and Safety Plan (SSHASP) that will be developed for the Work in accordance with the Site Specific Environmental Restoration Contract (SSERC) contract and associated Contract Management Procedures (CMPs), and these specifications.

b. The General Contractor and Excavation Subcontractor shall be held liable for any property damage or personal injury resulting from failure by the General Contractor or Excavation Subcontractor to take the required or adequate safety precautions.

1.12 "RECORD" DRAWINGS

a. The General Contractor shall maintain one record copy of all Specifications, Drawings, Addenda, Change Orders, and Shop Drawings at the site. The documents shall be kept in good order and annotated to show all changes made during the construction process.

b. The General Contractor shall submit to the Government within 30 days after the completion of contract, one set of blue-line prints of the Drawings which have been marked "As-Built Drawings" and shall contain all changes, additions, or deviations from the original set of Drawings that have been incorporated into the Work. Record prints shall accurately reflect locations, depths, and character of all buried and covered works.

1.13 WORK HOURS

a. Work hours shall be a maximum of five 10-hour days per week, Monday through Friday, with a 10-hour day worked every other Saturday. These work hours shall be extended only upon Government approval. During periods of extended low flow the Government may allow longer work hours and/or extended work weeks.

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 BASIS OF PAYMENT

a. The following paragraphs describe the measurement and payment for work to be done under the respective items listed in the Bid.

b. Each unit or lump sum price stated in the Bid shall constitute full compensation for each completed item of the work as indicated on the Drawings and as specified.

The actual number of units of each unit price item of work may be more, less, or never stated in the bidding schedule of the Bid or included in the Contract. No variation in the contract unit price will be made until the original quantities installed are varied by more than 25% and a hardship exists for the Contractor or the Owner. Payment will be made only for the actual number of units or work performed, and at the contract unit price for each such unit with measurement for payment made as defined in the following paragraphs.

1.1.1 Bonds and Insurance

a. Unit of Measure: Bonds and Insurance will be paid as a lump sum.

b. Payment shall be at the Contract lump sum price, which shall constitute full compensation for all costs associated with providing the required performance and payment bonds and insurance as specified in the General Conditions.

1.1.2 Site Preparation at Project Startup

a. Unit of Measure: Mobilization and Site Preparation at Project Startup will be paid as a lump sum.

b. Payment shall be at the Contract lump sum price, which shall constitute full compensation for all labor, materials, equipment, and tools required to complete all work associated with clearing and grubbing; access/haul roads and staging areas; installation of the dam; installation of the diversion system, including diversion piping to discharge below the Elm Street Bridge; and all associated appurtenances and controls. This item does not include payment for sheet pile installation, which will be paid for separately under Item Nos. 1.1.3 and 1.1.4 below or under Phase 1 items, nor does it include removal of the structure, which will be accomplished under a separate phase of this project. Payment for the construction and dewatering

of cells 11 and 12 will be paid under Phase 1 and will be used to supply a dry excavation for this work.

1.1.3 Sheet Pile Cutoff Wall – Provide and install to 10 feet embedment

a. Unit of measure: Payment for furnishing, installing, and maintaining the sheet pile cutoff wall (beneath and adjacent to the removable dam), all related excavation support system components (excluding bracing) will be measured and paid on a unit price basis, per linear foot of sheet pile as measured. Measurements will be based on the straight-line distance measured between field-verified points that designate the corners, endpoints, and intersections.

b. Payment for sheet pile cutoff wall under this item will include all work required to furnish all materials, labor, and equipment for installation, maintenance, and driving to an embedment depth of 10 feet as required by the specifications.

1.1.4 Sheet Pile – Driving below 10 feet embedment

a. Unit of measure: Payment for installing sheet pile used to construct cutoff wall (beneath and adjacent to the removable dam), including all related excavation support system components (excluding bracing) will be measured and paid on a unit price basis, per square foot of sheet pile as measured and driven below 10 feet embedment. Sheet piles common to one or more cofferdam cells shall not be measured more than once. Typically, lateral measurements will be based on the straight-line distance measured between field-verified points that designate the corners, endpoints, and intersections of containment cells.

b. Payment for sheet pile cutoff wall under this item will include all work required to furnish all materials, labor, and equipment for driving sheet piles to embedment depths below 10 feet as required by the specifications and directed by the General Contractor.

1.1.5 River Diversion System Gravity Operation

a. Unit of Measure: River Diversion System Gravity Operation will be measured on lump sum basis.

b. Payment shall be at the Contract lump sum, which shall constitute full compensation for all labor, materials, equipment, and tools required to complete all work associated with operation and maintenance of the gravity diversion system and the system controls, etc. Based on historical hydrologic records, covering the period of 10 May through 12 March, it is assumed that the gravity system would be operated approximately 80% of the time. During the remaining 20% of the time (between 10 May to 12 March), flows historically exceed the expected capacity of the pumping system.

1.1.6 Removal and Restoration of Stop Logs

a. Unit of measure: Removal and restoration of stop logs will be made per each event.

b. Payment shall be made at the fixed unit price for each complete removal and restoration of the stop logs and shall constitute full compensation for all labor, materials, equipment, and tools required to complete all work associated with the removal temporary storage and restoration of the stop logs. Bid Schedule Item 1.1.6a includes stop log removal without use of a crane. Bid Schedule Item 1.1.6b includes stop log removal requiring use of a crane.

1.1.7 Water Treatment System Operation

a. Unit of measure: Water Treatment System Operation will be measured on a lump sum basis.

b. Payment shall be made at the lump sum for complete operation of the water treatment system, including all labor, materials, equipment, and tools required to complete all work associated with successful operation of the system. Influent and effluent testing is not included in this item. Prior to beginning the work the Excavation Subcontractor shall submit a payment schedule for this item.

1.1.8 Soil/Sediment Excavation and Transport (includes stumps and debris)

a. The unit of measurement for excavation, stockpiling, handling and transport (not including off-site transport) of soil and sediment will be the cubic yard, computed by the average end area method or other appropriate method from elevation surveys taken before and after the excavation operations.

b. Payment will be made for the number of cubic yards of material measured in situ and removed from the excavation areas, including the excavation for required ditches, gutters, and channel changes. Volumes excavated beyond the neatline and outside of the limits of excavation will not be paid, with the exception of volumes removed as part of stump removal. (Penalties for excavation beyond neatline are discussed in Specification Section 02300, EARTHWORK.) Separate payment will not be made for stumps, which shall be considered part of the soil and sediment excavation volume (stumps will be required to be separated from soil and sediment for disposal purposes and “shaken” of all loose soil at the time and location of removal). The volume for payment will not include boulder and concrete volumes, which will be paid for under a separate payment item.

c. Payment will not include the volume of any excavation performed prior to the taking of elevations and measurements of the undisturbed grade. Payment includes

careful placement of excavated materials into trucks on the temporary access road located along the top of bank or in the river. Segregation of materials (soil, sediment, Toxic Substance Control Act (TSCA), non-TSCA, stumps, boulders, concrete, and debris) and placement into separate trucks, transport by truck from the excavation to the staging area, stockpiling, dewatering and handling (testing of the material will be performed by the General Contractor), and transport from the staging area to the GE On-Plant Consolidation Areas (OPCAs). (Payment for transport to the OPCA will be held as a percentage of the item until the transport is complete). Transport will include handling of all necessary manifesting and associated coordination with the General Contractor and the Government to obtain manifest authorization.

d. Payment includes installation and removal of all temporary dams at upstream and downstream ends of the work cells, and all dewatering required of the work cell and other areas downstream and upstream of the removable dam to maintain a dry excavation except as provided in Subsection 1.1.2, Site Preparation at Project Startup.

e. Payment will include excavation of soil, sediment, and tree stumps, and the excavation of loose, scattered rocks and boulders less than 2 feet in diameter, and concrete and masonry debris less than 1 cubic yard in volume collected within the limits of excavation.

f. Volumes of boulders and concrete to be paid for under separate items will be subtracted from the total volume as determined through survey measurements. The measurement will not include the volume of subgrade material or other material that is scarified or plowed and reused in-place, and will not include the volume excavated without authorization (excavations beyond the neat line) or the volume of any material used for purposes other than as directed.

1.1.9 Boulder Excavation and Transport

a. Unit of Measure: The unit of measure for payment of boulder excavation and transport will be the cubic yard.

b. For purposes of measurement, only boulders having a minimum dimension of 2 feet (as measured along all three perpendicular axes) shall be eligible for payment under this item. Volumes will be calculated based on measurements taken for each boulder. Size measurements will be taken along three perpendicular axes that represent the average dimension in each direction. The calculated volumes of boulders will be the basis for payment and will also be subtracted from the volume of sediment and soil excavated as determined by survey measurements.

c. Payment at the unit price bid will constitute full payment and shall constitute all compensation for all labor, equipment, material pumping, handling, and hauling of boulders to their disposal site. Backfill replacing boulder excavation will be

included in payments made under the appropriate payment item for backfill placement.

d. Payment includes transport by truck from the excavation to the staging area, and after processing by the General Contractor, transport from the staging area to the GE OPCAs or back to the excavation for reuse. Transport will include handling of all necessary manifesting and associated coordination with the General Contractor and the Government to obtain manifest authorization.

1.1.10 Ordered Overexcavation and Transport

a. Unit of Measure: Ordered overexcavation will be measured to the nearest 0.1 cubic yard as measured in place by survey. Ordered overexcavation will be performed at the direction of the Engineer for the purposes of removing unsuitable material found at the proposed subgrade or for the purposes of exploration.

b. Payment for overexcavation at the unit price shall constitute full compensation for excavation of material; loading excavated material onto trucks for disposal or stockpile of excavated material temporarily prior to backfill; or transport by truck from the excavation to the staging area, stockpiling, dewatering, and handling (testing of the material to be performed by the General Contractor); and transport from the staging area to the GE OPCAs. Transport will include handling of all necessary manifesting and associated coordination with the General Contractor and the Government to obtain manifest authorization. If additional requirements for sheeting and bracing, pumping, bailing, cleaning, and other incidentals are necessary to complete the work, a change order will be negotiated for these items.

1.1.11 Concrete Excavation and Transport

a. Unit of Measure: The unit of measure for payment of concrete excavation and transport will be the cubic yard. For purposes of measurement, only concrete pieces having a minimum size of 1 cubic yard (as measured by taking appropriate measurements of the concrete structure prior to excavation) shall be eligible for payment under this item. Measurements will be taken along appropriate dimensions of the concrete structure to be excavated.

b. Payment will be made for acceptably excavated concrete or masonry pieces having a minimum size of 1 cubic yard. The calculated volume of concrete will be the basis for payment and will also be subtracted from the volume of sediment and soil excavated as determined by survey measurements. Backfill replacing concrete excavation will be included in payments made under the appropriate payment item for backfill placement. Concrete or masonry pieces that are less than 1 cubic yard shall be considered part of Soil/Sediment Excavation or Ordered Overexcavation and are not paid under this item.

c. Payment shall be at the unit price per cubic yard bid and shall constitute full compensation for all labor, equipment, and materials required to excavate or otherwise remove from the work area and transport by truck from the excavation to the staging area. Transport will include handling of all necessary manifesting and associated coordination with the General Contractor and the Government to obtain manifest authorization.

1.1.12 Embedded Concrete Removal, Excavation, and Transport

a. Unit of Measure: Measurement for payment for concrete removal shall be the number of cubic yards of concrete measured in place before removal, within payment limits indicated on the Drawings and as authorized by the Engineer in writing. Measurement shall be made to the authorized limits to the nearest 0.1 cubic yard.

b. The volume of concrete requiring removal with a jack hammer or other device which may be needed to sever the concrete off at the authorized limits shall be determined by its average length, width, and depth as determined by the Engineer.

c. Payment for concrete removal, excavation, and transport shall be made at the contract unit price per cubic yard. Said price shall constitute full compensation for furnishing all labor, material, and equipment required to sever, remove, excavate, and transport embedded concrete.

1.1.13a through 1.1.13e Backfill Materials

a. Unit of measure: The unit of measure for supply, testing, placement, and compaction of backfill will be to the nearest 0.1 cubic yard of compacted backfill in place.

b. Payment is limited to backfill supplied and placed to the thicknesses shown on the plans or specified. No additional payment shall be made for placing excess fill. The contractor shall remove or regrade fill placed to a greater thickness than shown or specified, unless otherwise directed by the Engineer.

c. Backfill shall not be measured until tests conducted by this Subcontractor and approved by the Engineer demonstrate that it has been compacted as specified. The Engineer shall provide all surveying required for measurement of backfill.

d. Payment shall constitute full compensation for all labor, equipment, tools, supplies, and incidentals necessary to complete the work. Payment for backfill shall be based on a unit price per cubic yard, as measured in place after grading and compaction, for each material specified (Bid Schedule Items 1.1.13a through 1.1.13f). This unit price shall include all labor, equipment, materials, and any other items necessary or incidental to provide, place, grade, compact as specified, and test backfill materials and any incidentals necessary to complete backfilling.

e. Supply and delivery of the backfill materials are specified in Section 02111 - HANDLING OF EXCAVATED MATERIAL AND BACKFILL. All supply and testing of backfill will be conducted by the Excavation Subcontractor, except for chemical testing, which will be conducted by the General Contractor.

1.1.14 Geotextile Fabric

a. Unit of measure: The geotextile shall be measured by the square yard of surface area covered, as measured parallel to the ground surface measured to the nearest 0.1 foot.

b. Payment shall be made at the unit price for all geotextile fabric acceptably placed in areas as required on the plans and by the specifications. Payment shall constitute full compensation for all labor, materials, equipment, and incidentals required to install the geotextile in accordance with the specifications to the limits shown.

1.1.15 Erosion Control Blankets

a. Unit of measure: The erosion control blankets shall be measured by the square yard of surface area covered, as measured parallel to the slope along the finished surface to the nearest 0.1 foot.

b. Payment shall be made at the unit price for all erosion control blanket acceptably placed in areas as required on the plans and by the specifications. Payment shall constitute full compensation for all labor, materials, equipment, and incidentals required to install the erosion control blanket in accordance with the specifications to the limits shown.

1.1.16 Temporary Erosion Control – Riprap

a. Unit of measure: Riprap temporary erosion control shall be measured by the cubic yard placed. The riprap will be measured prior to installation in the delivery vehicle to the nearest 0.25 cubic yard.

b. Payment will be for riprap placed for temporary erosion control as shown on the Drawings at the unit price bid and shall constitute full compensation for providing, installing, and removing riprap; cleaning sediment from riprap; and reinstalling to the next location shown, as directed by the Engineer. No separate payment shall be made for subgrade preparation or installation of underlying geotextile fabric. Riprap materials will be provided by the Excavation Subcontractor initially and as needed to supplement the materials recovered.

c. Payment at the unit price bid will constitute full compensation for all labor, equipment, and incidentals to remove/replace/relocate riprap as needed for work to progress. No separate payment shall be made for subgrade preparation.

1.1.17 Seed

a. Unit of measure: The unit of measure will be the area of acceptably seeded surface in units of square yards. Measurements will be made parallel to the surface to the nearest 0.1 foot.

b. Seeding will be paid for at the contract price per unit area of acceptably seeded surface of the riverbank surface. Payment shall constitute full compensation for all labor, materials, and equipment to furnish and install the specified seed mix, fertilizer, and lime, and watering until specified plant coverage is established.

1.1.18 Soldier Pile Installation and Drilling for West Bank Permanent Retaining Wall

a. Unit of Measure: Installation of soldier piles for construction of west bank permanent retaining wall will be by the foot measured to the nearest 0.1 foot vertically.

b. The installation of soldier piles shall be paid at the contract unit price for each vertical foot of soldier piles installed and shall constitute full compensation for all materials, labor, equipment, and other incidentals including drilling, soldier pile placement, and backfilling as required. Bid Schedule Item 1.1.18a will be a unit price for installation through overburden, and Bid Schedule Item 1.1.18b will be a unit price for installation through rock.

1.1.19 West Bank Sheet Pile Retaining Wall – Provide and Install

a. Unit of measure: Payment for furnishing, installing, and maintaining the west bank sheet pile retaining wall (excluding soldier piles – see Subsection 1.1.18 above), and all related bracing components will be measured and paid on a lump sum basis. Measurements for partial payments will be based on the straight-line distance measured between field-verified points that designate the corners, endpoints, and intersections.

b. Payment for sheet pile cutoff wall under this item will include all work required to furnish all materials, labor, and equipment for installation, maintenance, and driving as required by the specifications.

1.1.20 East Bank Sheet Pile Retaining Wall – Provide and Install

a. Unit of measure: Payment for furnishing, installing, and maintaining the east bank sheet pile retaining wall (from Station 514+00 to 518+00), and all related temporary (as required) and permanent bracing components will be measured and paid on a lump sum basis. Measurements for partial payments will be based on the straight-line distance measured between field-verified points that designate the corners,

endpoints, and intersections. Sheets will be either battered at a 10-degree angle or vertical.

b. Payment for sheet pile cutoff wall under this item will include all work required to furnish all materials, labor, and equipment for installation, maintenance, and driving to the embedment depth required by the Engineer and as required by the specifications.

1.1.21 Cellular Confinement Slope Restoration

a. Unit of measure: Cellular Confinement Slope Restoration will be measured on lump sum basis.

b. Payment shall be made for all cellular slope restoration acceptably placed in areas as required on the plans and by the specifications. Payment shall constitute full compensation for all labor, materials, equipment, and incidentals required to install the cellular system in accordance with the specifications to the limits shown. Payment for the cellular confinement slope restoration shall be based on a lump sum, for each area specified (Bid Schedule Items 1.1.21a through 1.1.21c). These lump sum prices shall include all labor, specialty subcontractor personnel, equipment, materials (including top soil), and any other items necessary or incidental to provide, place, grade, compact as specified, and test the cellular confinement slope restoration system and any incidentals necessary to complete backfilling.

1.2 INCIDENTAL WORK

a. The following incidental work items will not be measured for separate payment and should be included in the above payment items:

1. Submittals.

2. Grubbing, stump excavation, and metallic debris excavation.

3. Temporary Construction Facilities, including electrical power and other utilities and construction and office trailers and storage containers.

4. Cleanup.

5. Restoration of property outside the limits of payment.

6. Cooperation with other contractors and others as required.

7. Minor items such as replacement of fences, guardrails, rock walls, etc.

8. Temporary erosion controls such as silt fence, straw bale, rock check dam installation, and other miscellaneous controls not otherwise paid for directly under the above items.

9. All dewatering.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01025 ATTACHMENT

BID SCHEDULE

BID SCHEDULE FORM

The following Bid shall be completed in ink or typewritten. The amount of each Bid total shall be shown in both words and figures. The successful Bidder will be required to furnish a Bid breakdown in accordance with the following:

BID SCHEDULE

The BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following lump sum and unit prices:

ITEM NUMBER	BRIEF DESCRIPTION OF ITEM WITH UNIT BID IN WORDS	UNIT BID PRICE IN FIGURES	QUANTITY	TOTAL AMOUNT IN FIGURES
	EXCAVATION SUBCONTRACTOR BID ITEMS (1 THROUGH 21)			
1.1.1	Bonds and Insurance			
	Lump Sum	_____	1 L.S.	$ _____
1.1.2	Site Preparation at Project Startup			
	Lump Sum	_____	1 L.S.	$ _____
1.1.3	Sheet Pile Cutoff Wall – Provide and install to 10 feet embedment			
	Linear Foot	_____	150 L.F.	$ _____
1.1.4	Sheet Pile– Driving below 10 feet embedment			
	Square Foot	_____	2472 S.F.	$ _____

ITEM NUMBER	BRIEF DESCRIPTION OF ITEM WITH UNIT BID IN WORDS	UNIT BID PRICE IN FIGURES	QUANTITY	TOTAL AMOUNT IN FIGURES
1.1.5	River Diversion System Gravity Operation			
	_____ Lump Sum	_____	1 L.S.	$ _____
1.1.6	Removal and Restoration of Stop Logs			
a.	Without Crane			
	_____ Each Event	_____	7 EA	$ _____
b.	With Crane			
	_____ Each Event	_____	7 EA	$ _____
1.1.7	Water Treatment System Operation			
	_____ Lump Sum	_____	1 L.S.	$ _____
1.1.8	Soil/Sediment Excavation and Transport (includes stumps and debris)			
	_____ Cubic Yard	_____	6,400 C.Y.	$ _____
1.1.9	Boulder Excavation and Transport			
	_____ Cubic Yard	_____	500 C.Y.	$ _____

ITEM NUMBER	BRIEF DESCRIPTION OF ITEM WITH UNIT BID IN WORDS	UNIT BID PRICE IN FIGURES	QUANTITY	TOTAL AMOUNT IN FIGURES
1.1.10	Ordered Overexcavation and Transport			
	_____ Cubic Yard	_____	500 C.Y.	$ _____
1.1.11	Concrete Excavation and Transport			
	_____ Cubic Yard	_____	1,000 C.Y.	$ _____
1.1.12	Embedded Concrete Removal, Excavation, and Transport			
	_____ Cubic Yard	_____	250 C.Y.	$ _____
1.1.13a - g	Backfill Materials			
a.	Common Fill			
	_____ Cubic Yard	_____	2,160 C.Y.	$ _____
b.	Common Fill - Filter Grade			
	_____ Cubic Yard	_____	710 C.Y.	$ _____
c	Filter Material			
	_____ Cubic Yard	_____	710 C.Y.	$ _____
d	Topsoil			
	_____ Cubic Yard	_____	230 C.Y.	$ _____

ITEM NUMBER	BRIEF DESCRIPTION OF ITEM WITH UNIT BID IN WORDS	UNIT BID PRICE IN FIGURES	QUANTITY	TOTAL AMOUNT IN FIGURES
e	9-inch Riprap _____ Cubic Yard	_____	620 C.Y.	$ _____
f	12-inch Riprap _____ Cubic Yard	_____	530 C.Y.	$ _____
g	18-inch Riprap _____ Cubic Yard	_____	1,380 C.Y.	$ _____
1.1.14	Geotextile Fabric _____ Square Yard	_____	1,000 S.Y.	$ _____
1.1.15	Erosion Control Blankets _____ Square Yard	_____	1,625 S.Y.	$ _____
1.1.16	Temporary Erosion Control – Riprap _____ Cubic Yard	_____	250 C.Y.	$ _____

ITEM NUMBER	BRIEF DESCRIPTION OF ITEM WITH UNIT BID IN WORDS	UNIT BID PRICE IN FIGURES	QUANTITY	TOTAL AMOUNT IN FIGURES
1.1.17	Seed			
	_____ Square Yard	_____	1,625 S.Y.	$ _____
1.1.18	Soldier Pile Installation and Drilling for West Bank Permanent Retaining Wall			
a.	Soil Drilling			
	_____ Foot	_____	63 FT	$ _____
b.	Rock Drilling			
	_____ Foot	_____	105 FT	$ _____
c.	Install Sheet Pile Soldiers in Caissons			
	_____ Each	_____	21 EA	$ _____
1.1.19	West Bank Sheetpile Retaining Wall			
	_____ Lump Sum	_____	1 L.S.	$ _____
1.1.20	East Bank Sheetpile Retaining Wall			
	_____ Lump Sum	_____	1 L.S.	$ _____
1.1.21	Cellular Confinement Slope Restoration			

ITEM NUMBER	BRIEF DESCRIPTION OF ITEM WITH UNIT BID IN WORDS	UNIT BID PRICE IN FIGURES	QUANTITY	TOTAL AMOUNT IN FIGURES
a.	East Bank - Station 514 +0 to 518+0 (9,450 sf) Lump Sum		1 L.S.	$
b.	East Bank - Station 518+0 to Elm St. Bridge (2,800 sf) Lump Sum		1 L.S.	$
c.	West Bank - Above Sheetpile Retaining Wall (3,450 sf) Lump Sum		1 L.S.	$
Alternate Items				
1.1.22a - f	Backfill Materials			
a	Structural Fill Cubic Yard		100 C.Y.	$
b	Bank Run Gravel Cubic Yard		100 C.Y.	$
c	Select Gravel Cubic Yard		200 C.Y.	$
d	Sand Cubic Yard		100 C.Y.	$

ITEM NUMBER	BRIEF DESCRIPTION OF ITEM WITH UNIT BID IN WORDS	UNIT BID PRICE IN FIGURES	QUANTITY	TOTAL AMOUNT IN FIGURES
e	Processed Gravel _____ Cubic Yard	_____	100 C.Y.	$ _____
f	Screened or Crushed Stone _____ Cubic Yard	_____	100 C.Y.	$ _____

SECTION 01090

ABBREVIATIONS AND SYMBOLS

PART 1 GENERAL

1.1 DESCRIPTION

a. The following is a listing of common abbreviations and symbols that may be found in the Contract Documents. Since this is a general list, it is to be expected that not all abbreviations will appear.

b. Abbreviations for published codes, standards, and regulations of organizations and federal agencies are defined in Section 01080 CODES AND STANDARDS.

c. Additional abbreviations and symbols can be found in Drawing Legends.

d. Abbreviations and/or symbols not specifically defined will be industry-accepted standard definitions. Clarification of symbols and/or abbreviations shall be forwarded to the Engineer, who will furnish definitions in writing.

1.2 ABBREVIATIONS

The following is a partial list of abbreviations and meanings that may appear in the Specifications:

A.C. or ac	Alternating Current
a or A	Amperes
AFF	Above Finished Floor
amp or AMP	Amperes
Alum.	Aluminum
ARARs	Applicable or Relevant and Appropriate Requirements
Asph.	Asphalt
Aux.	Auxiliary
AWG	American or Brown and Sharp Wire Gage
Bit. Conc.	Bituminous Concrete
Btu	British Thermal Unit
CB	Circuit Breaker
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Cl.	Class
cm	Centimeter
CMPs	Contract Management Procedures
C.O.	Clean Out

Conc.	Concrete
Cont.	Continuous
Cu.	Cubic
cc	Cubic Centimeters
C.F.	Cubic Feet
CFM or cfm	Cubic Feet Per Minute
CFS or cfs	Cubic Feet Per Second
C.Y.	Cubic Yards
CT	Current Transformer
D.C. or dc	Direct Current
Dia.	Diameter
DWG. or dwg	Drawing
Dr.	Drive
Ea. or ea.	Each
EF	Each Face
EW	Each Way
Eff. or eff	Efficiency
El. or Elev.	Elevation
Fin. Gr.	Finished Grade
fps	Feet Per Second
Ft. or ft	Feet
ftg.	Footing
g.	Grams
Ga. or ga	Gauge
Gal. or gal.	Gallon
Galv.	Galvanized
GPD or gpd	Gallon Per Day
GPM or gpm	Gallons Per Minute
H-O-A	Hand-off-automatic
Hz. or hz.	Hertz
I.D.	Inside Diameter
Inv.	Invert
IP	Instrument Panel
KVA or kva	Kilovolts-amperes
KW or kw	Kilowatt Hours
Lbs. or lbs	Pounds
L.F. or lf	Linear Feet
LPA	Lighting Panel “A”
L.S.	Lump Sum
m.	Meters
mA.	Milliamperes
Max. or max.	Maximum
MCC	Motor Control Center
mg.	Milligrams
MGD or mgd	Million Gallons Per Day
mi.	Miles

Min. or min.	Minimum
mm	Millimeters
No. or no.	Number
nom.	Nominal
NPT	National Pipe Thread
N.T.S.	Not To Scale
O.D.	Outside Diameter
OS&Y	Outside Screw and Yoke
Oz. or oz.	Ounce
pb	Pushbutton
PPD	Pounds Per Day
P/B	Pullbox
pri.	Primary
psf	Pounds Per Square Foot
psi	Pounds Per Square Inch
psig	Pounds Per Square Inch, Gauge Pressure
PT	Potential Transformer
Pvt. or Pvmt.	Pavement
R.	Radius
R.O.W.	Right-Of-Way
Sch.	Schedule
sec.	Secondary or Seconds
Sq. or sq.	Square
S.F.	Square Feet
SSERC	Site-Specific Environmental Restoration Contract
SSHASP	Site-Specific Health and Safety Plan
S/S/P	Stop-Start-Pilot Station
Std. or std.	Standard
S.Y.	Square Yard
T&B	Top and Bottom
Typ.	Typical
U.O.N.	Unless Otherwise Noted
V or v	Volts
VAC or vac	Alternating Current Voltage
VDC or vdc	Direct Current Voltage
V.F.	Vertical Feet
Vol.	Volume
W or w	Watts
w.c.	Water Column
WSP	Working Steam Pressure
Yd. or yd	Yard

1.3 SYMBOLS

The following is a list of commonly used symbols and meanings that may appear in the Drawings and Specifications:

ϕ	Phase, Diameter, or Round (as applicable)
^{o}F, ^{o}C	Degrees (F. = Fahrenheit C. = Centigrade)
‘	Feet or Minutes
“	Inches or Seconds
#	Number or Pound
/	Per or Divided By
3:1	3 horizontal to 1 vertical (slope)
1 on 3	1 vertical on 3 horizontal (slope)

END OF SECTION

SECTION 01300

CONSTRUCTION PROGRESS AND SCHEDULES

PART 1 GENERAL

1.1 PRECONSTRUCTION CONFERENCE

a. Prior to issuance by the Government to the General Contractor of the Notice to Proceed with the work, a conference will be held to discuss the construction schedule, to establish procedures for handling vendor drawings and other submissions, for processing applications for payment, and to establish a working understanding between the parties as to the Project.

b. Present at the preconstruction conference will be the General Contractor's project manager, site manager, and quality assurance manager, the Excavation Subcontractor and his Superintendent and quality assurance manager, a GE representative, the U.S. Environmental Protection Agency (USEPA) representative, and the Corps of Engineers project manager. Duties will be defined and minutes of the meeting will be prepared and distributed to all parties in attendance.

1.2 NOTICE TO PROCEED

a. The General Contractor will deliver to the Excavation Subcontractor a written Notice to Proceed, stating a date on which the Excavation Subcontractor shall start the work. Contract time shall commence on this date.

1.3 SUBMITTALS

The following submittals shall be provided in accordance with Section 01330 – Submittal Procedures:

SD-01 Preconstruction Submittals

Construction Schedule – see description under Products below.

SD-06 Test Reports

Daily Project Report – see description under Products below.

Monthly Project Report – see description under Products below.

SD-11 Closeout Submittals

Final Project Report – see description under Products below.

PART 2 PRODUCTS

2.1 CONSTRUCTION SCHEDULE

a. Within 15 days after the execution of this Contract, the Excavation Subcontractor shall submit to the General Contractor for approval a construction schedule and network diagram consisting of the activities and events that must be accomplished to complete the work within the contract completion time and shall show the planned sequence of accomplishment, interdependencies, and interrelationships. For initial scheduling, the Excavation Subcontractor shall allot 15 working days from General Contractor's receipt for the time necessary for review and approval of all shop drawings and items requiring the approval of the General Contractor.

b. The construction schedule, as submitted to the General Contractor, shall include the following items:

1. A list of the event numbers, their description, the expected and latest allowable start and finish dates, slack or float time, schedule date and actual completion date.

2. The data, as mentioned above, shall be plotted on a graph of activity versus calendar days.

c. The graphic network diagrams, network, illustrations, or other pertinent material shall be fully legible and capable of being folded over to 8.5 x 11 inches so that they may be unfolded while inserted in a standard three-ring binder, with a maximum sheet size being 24 x 36 inches.

d. The construction schedule and network, as described herein, shall be Critical Path Method (CPM), Program Evaluation and Review Techniques (PERT), or similar approved construction scheduling.

e. The Construction Schedule will not show any accounting for the probable shutdown of the work due to "spring runoff" nor will it account for potential standby time due to flood preparation, standby during flooding, cleanup after flooding, or delays related to the presence of NAPL. Extension of contract completion date will be granted in a change order for each of these activities should they occur.

f. The Excavation Subcontractor shall also submit a schedule of anticipated amounts of each monthly payment that will be due based upon the construction schedule.

2.2 REVIEW MEETING

a. A meeting will be held within 21 calendar days after the awarding of the contract to discuss the construction schedule. The Excavation Subcontractor shall submit to the

General Contractor a proposed schedule for procurement of materials and equipment at this meeting. The schedule network and diagram will be adjusted to reflect mutually agreed upon events, activities, and time elements to assure that the method of accomplishing the work as displayed thereon is in conformance with the overall plan and that the entire project is broken into manageable segments that will permit realistic progress analysis.

b. This revised network will serve as the first network for management and control of the project and shall be submitted to the General Contractor for approval within 60 calendar days after the awarding of the contract. Firm shipping dates for all equipment shall be included.

2.3 MONTHLY SCHEDULE UPDATES

a. Two copies of the construction schedule shall be submitted each month to the General Contractor, marked to show the progress of the various activities and noting any delays on progress. If delays are encountered because of changes in plans or in the quantity of work, or if the Excavation Subcontractor has failed to comply with the approved schedule, he shall submit to the General Contractor for his approval a revised schedule and network diagram with a suitable explanation indicating his proposed changes and shall prosecute the balance of the work so as to complete the project in the time specified. Only after approval of the revised schedules shall the Excavation Subcontractor proceed with his proposed changes in the execution and scheduling of the work.

b. Monthly estimates for payment will <u>not</u> be processed if the Excavation Subcontractor fails to submit the initial construction schedule and network diagram or any revisions or updating as noted herein. These reasons shall be sufficient cause for certification that the rate of progress is not satisfactory and/or that the Excavation Subcontractor's personnel directly responsible for maintaining progress of the work are not performing their work in a proper and skilled manner.

2.4 PROGRESS REPORTING

A Daily, Monthly, and Final Project Report shall be submitted by the General Contractor to report the progress of construction activities. Each report shall be submitted to the Government for review and approval.

2.4.1 Daily Project Report

A Daily Project Report shall be completed by the General Contractor for each day of construction activities and shall be submitted the following day to the Government for review and approval. The Daily Project Report shall contain the following items:

a. Contractors Quality Control Report (CQR)

The CQR shall contain information on activities in progress including equipment and materials received on site, delays in work progress, visitor information, samples collected including air, water, or backfill testing, sample results received, verbal instructions from the Government to the General Contractor, any safety inspections completed, any preparatory or initial inspections, activities started or finished, punch list issuance and/or corrections, labor hours, equipment hours, accident reporting, and any other relevant information.

b. Excavation Subcontractor Daily Report

The Excavation Subcontractor shall provide a daily field and quality control report to the General Contractor to be submitted as part of the Daily Project Report and shall include as applicable a water treatment log, backfill log, sheet pile installation log, excavation log, and safety log.

c. Attachments

1. Attachments to the Daily Project Report shall include daily field crew reports, copies of manifests for transportation of materials to the contaminated materials staging areas or the OPCAs, tables of any sampling results, delivery receipts for backfill materials, police detail vouchers for traffic control, and any other pertinent tickets or vouchers.

2. Daily Turbidity Monitoring Results and Daily Air Monitoring Results shall be included in the Daily Project Report per that stated in Specification Section 01410.

2.4.2 Monthly Project Report

A Monthly Project Report shall be completed by the General Contractor during each month of construction activities and shall be submitted to the Government by the 10^{th} day of the subsequent month for review and approval. The Monthly Project Report shall contain the following items:

a. The Monthly Project Report shall contain an overview section, a section on all tasks performed over the course of the month, a description of all sampling test results received during the month including water treatment plant, backfill, air, and water sample results, a section on reports received or prepared, and a section on anticipated tasks that will be accomplished in the coming month.

b. Attachments

Attachments to the Monthly Project Report shall include photo documentation of work performed during the month, a figure or site plan detailing the area in which work was performed over the course of the month and the location of relevant work

items. In addition to the photo documentation and site plan several tables shall be attached to the report when applicable including, but not limited to the following:

- Quantity of Bank and Sediment Material Generated During the Month
- Quantity of Bank and Sediment Material Excavated to Date
- Quantity of Material Transferred to OPCAs During the Month
- Quantity of Material Transferred to OPCAs to Date
- Quantity of Material Transferred to Off Site Disposal Facilities During the Month
- NPDES PCB Sampling Results for Water Treatment System
- NPDES non-PCB Sampling Results for Water Treatment System
- Backfill Material Testing Results
- Daily Air Monitoring Results
- Daily Water Column Turbidity Monitoring Results
- Summary of Turbidity, PCB, and TSS Water Column Monitoring Results
- PCB Air Sampling Results

Other reporting included in the Monthly Project Report shall consist of any other analytical data received during the month and monitoring results collected including vibration monitoring, and noise monitoring results.

2.4.3 Final Project Report

A Final Project Report shall be completed by the General Contractor at the end of construction activities for the project. The Final Project Report shall summarize all work performed and any deviations from the original project design. In addition, summary tables of overall quantities of bank and sediment material generated, overall quantity of material transferred to the OPCAs, and overall quantity of material transferred to off site disposal facilities shall be included in the report. A section of the Final Project Report shall include the Final Project Monitoring Report summarizing all project monitoring data per Specification Section 01410.

PART 3 EXECUTION

3.1 WEEKLY MEETINGS

a. Meetings between the General Contractor, Excavation Subcontractor, and Government will be held weekly for the purpose of reviewing the progress of the contract and the upcoming week's work. The General Contractor shall have the Site Manager and the Project Manager attend these meetings.

END OF SECTION

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUBMITTAL IDENTIFICATION

Submittals required are identified by SD numbers as follows:

SD-01 Preconstruction Submittals

SD-02 Shop Drawings

SD-03 Product Data

SD-04 Samples

SD-05 Design Data

SD-06 Test Reports

SD-07 Certificates

SD-08 Manufacturer's Instructions

SD-09 Manufacturer's Field Reports

SD-10 Operation and Maintenance Data

SD-11 Closeout Submittals

1.2 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.2.1 Government Approved

Governmental approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.2.2 Information Only

All submittals not requiring Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.3 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing, and other information are satisfactory. Approval will not relieve the General Contractor of the responsibility for any error that may exist, as the General Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no re-submittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.4 DISAPPROVED SUBMITTALS

The General Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. If the General Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.5 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL

The General Contractor and his subcontractors shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready

determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control (CQC) System Manager and each item shall be stamped, signed, and dated by the CQC System Manager indicating action taken. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

3.2 SUBMITTAL REGISTER (ENG FORM 4288)

At the end of this section is one set of ENG Form 4288 listing items of equipment and materials for which submittals are required by the specifications; this list may not be all-inclusive and additional submittals may be required.

3.3 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 14 calendar days exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals.

3.4 TRANSMITTAL FORM (ENG FORM 4025)

The sample transmittal form (ENG Form 4025) attached to this section shall be used for submitting both Government-approved and information-only submittals in accordance with the instructions on the reverse side of the form. This form shall be properly completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

3.5 SUBMITTAL PROCEDURE

Submittals shall be made as follows:

3.5.1 Procedures

Submit eight copies of each submittal item with an attached ENG Form 4025 Transmittal Form. Send all submittals to Weston Solutions, Inc., Attn: Submittal Clerk, 10 Lyman Street, Suite 2, Pittsfield, MA 01201. Additional copies of each submittal shall be maintained on file by the General Contractor on-site.

3.5.2 Deviations

For submittals that include proposed deviations requested by the General Contractor, the column "variation" of ENG Form 4025 shall be checked. The General Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

3.6 CONTROL OF SUBMITTALS

The General Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the General Contractor scheduled submittal date shown on the approved "Submittal Register."

3.7 GOVERNMENT-APPROVED SUBMITTALS

Upon completion of review of submittals requiring Government approval, the submittals will be identified as having received approval by being so stamped and dated. Two copies of the submittal will be retained by the Contracting Officer and six copies of the submittal will be returned to the General Contractor. An additional copy will be provided by the General Contractor to GE.

3.8 INFORMATION-ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the General Contractor to resubmit any item found not to comply with the contract. This does not relieve the General Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the General Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. Where submittals are being required by subcontractors to the General Contractor, the above described requirements will flow down to the subcontractors.

3.9 STAMPS

Stamps used by the General Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

APPROVED ( )
APPROVED AS CORRECTED ( )
REVISE AND RESUBMIT ( )
NOT APPROVED ( )
NO ACTION REQUIRED ( )

Checking is only for conformance with the de-sign concept and functional result of the Project and compliance with the information given in the Contract Documents. Contractor is responsible for dimensions to be confirmed and correlated at the job site; for information that pertains solely to the fabrication processes or to techniques of construction; and for coordination of the work of all trades.

Weston Solutions, Inc.

Date_____ By_____

END OF SECTION

SPECIFICATION 01330 ATTACHMENT

SUBMITTAL REGISTER

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1	SUBMITTAL REGISTER																										CONTRACT NO.
2	TITLE AND LOCATION: Draft Design Submittal, 1.5 Mile Removal Action - Phase 1/2 Transition Area GE/Housatonic River Project, Pittsfield, Massachusetts																	CONTRACTOR									SPECIFICATION SECTION
3					TYPE OF SUBMITTAL											CLASSIFI-CATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
4	TRANSMITTAL NO.	ITEM NO.	SPECIFICATION PARAGRAPH NO.	DESCRIPTION OF ITEM SUBMITTED	SD-01 PRECONSTRUCTION SUBMITTALS	SD-02 SHOP DRAWINGS	SD-03 PRODUCT DATA	SD-04 SAMPLES	SD-05 DESIGN DATA	SD-06 TEST REPORTS	SD-07 CERTIFICATES	SD-08 MANUFACTURER'S INSTRUCTIONS	SD-09 MANUFACTURER'S FIELD REPORTS	SD-10 OPERATION AND MAINTENANCE DATA	SD-11 CLOSEOUT SUBMITTALS	FOR INFORMATION ONLY	GOVERNMENT APPROVAL	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATEIRAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE	DATE	REMARKS
5			01015, 1.3	Record Drawings											X		X										
6			01300, 1.3	Project Schedules	X											X											
7			01300, 1.3	Daily Project Report						X							X										
8			01300, 1.3	Monthly Project Report						X							X										
9			01300, 1.3	Final Project Report											X		X										
10			01340, 1.3	Cell by Cell Survey Updates						X							X										
11			01355, 1.5	Environmental Protection Plan Supplement	X												X										
12			01410, 1.4	Ambient Air Monitoring Plan Supplement	X												X										
13			01410, 1.4	Water Column Monitoring Plan Supplement	X												X										
14			01410, 1.4	Noise Monitoring Plan	X												X										
15			01410, 1.4	Settlement Monitoring Plan Supplement	X												X										
16			01410, 1.4	Vibration Monitoring Plan Supplement	X												X										
17			01410, 1.4	Conditions Monitoring Plan Supplement	X												X										
18			01410, 1.4	Manufacturer's Cut Sheets for Vibration Monitoring Devices		X											X										
19			01410, 1.4	Manufacturer's Cut Sheets for Noise Monitoring Devices		X											X										
20			01410, 1.4	Air Monitoring Daily Report						X							X										
21			01410, 1.4	Monthly Project Report						X							X										
22			01410, 1.4	Water Column Monitoring Daily Report						X							X										
23			01410, 1.4	Final Project Monitoring Report											X		X										
24			01451, 1.2	Contractor Quality Control Plan Supplement	X												X										
25			01451, 1.2	Daily CQC Report										X			X										
26			02111, 1.1	Excavation Plan	X																						
27			02111, 1.1	Analytical Test Reports for Backfill Materials						X							X										
28			02111, 1.1	Paint Filter Test Results						X							X										
29			02111, 1.1	Geotechncial Test Reports for Backfill Materials						X							X										
30			02111, 1.1	Wipe Sampling Data						X							X										
31			02230, 1.2	Materials Proposed for Off-Site Disposal	X												X										
32			02230, 1.2	Site Preparation Plan	X												X										
33			02300, 1.2	Excavation Plan	X												X										
34			02300, 1.2	In-place compaction testing data						X						X											
35			02300, 1.2	Visual Inspection Reports						X						X											
36			02300, 1.2	Bonding Agent Data Sheets			X									X											
37			02360, 1.2	Experience Certification	X											X											
38			02360, 1.2	Schedule	X											X											
39			02360, 1.2	Excavation Plan	X											X											
40			02360, 1.2	Drill Shaft Test Reports						X						X											
41			02370, 1.3	Storm Damage and High Flow Damage Prevention Plan	X												X										
42			02370, 1.3	Stop Log Removal Plan	X											X											
43			02370, 1.3	In-River Remediation Area Work Plan	X											X											
44			02370, 1.3	Mulch, Geotextile Farbric, Erosion Control Fabric, Fertilizer			X									X											
45			02370, 1.3	Synthetic Soil Binders						X						X											
46			02370, 1.3	Construction Work Sequence Schedule						X						X											
47			02370, 1.3	Installer's Qualifications						X						X											
48			02370, 1.3	Mulch						X						X											

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1	SUBMITTAL REGISTER																										CONTRACT NO.
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49			02370, 1.3	Asphalt Adhesive						X						X											
50			02370, 1.3	Tackifier						X						X											
51			02370, 1.3	Wood Byproducts						X						X											
52			02370, 1.3	Certificate Form for Erosion and Sediment Controls							X					X											
53			02370, 1.3	Daily Forecast Reports										X		X											
54			02370, 1.3	Average Daily Flow - Newell Street										X		X											
55			02370, 1.3	Rainfall Snowpack Measurements										X		X											
56			02370, 1.3	Daily Records for limitation of storm/high flow damage										X		X											
57			02370, 1.3	Monthly Inspection Report for E&S Controls										X		X											
58			02371, 1.3	Out of River Erosion and Sedimentation Control Plan	X												X										
59			02372, 1.4	NAPL Management Plan	X												X										
60			02450, 1.2	Final Slope Protection Design	X																						
61			02450, 1.2	Manufacturer's Recommended Handling, Installing, and Repair Procedures.								X																
62			02464, 1.1	Dewatering Plan (Submitted as Part of Excavation Plan, Section 02300)	X												X										
63			02464, 1.2	Sheet Pile Installation Plan	X											X											
64			02464, 1.2	Metal Sheet Piling		X										X											
65			02464, 1.2	Wipe sample results for sheets						X							X										
66			02464, 1.2	As-Built Drawing - Groundwater Cutoff Wall and Permanent Sheet Pile Wall										X			X										
67			02930, 1.2	Planting Subcontractor Oversight Personnel Qualifications	X												X										
68			02930, 1.2	Equipment for revegetation			X									X											
69			02930, 1.2	Delivery Schedules			X									X											
70			02930, 1.2	Plant Establishment Period			X									X											
71			02930, 1.2	Maintenance Record			X									X											
72			02930, 1.2	Plant Material							X					X											
73			02930, 1.2	Seed Mix							X					X											
74			02930, 1.2	Erosion Control Blankets							X					X											
75			02930, 1.2	Fertilizer							X					X											
76			02930, 1.2	Compost							X																
77			02930, 1.2	Maintenance Instructions										X		X											
78			02930, 1.2	Planting Record Drawings											X		X										
79			03100, 1.2	Concrete Formwork Details		X										X											
80			03100, 1.2	Form Releasing Agents			X									X											
81			03100, 1.2	Design and calculations for form design					X							X											
82			03200, 1.2	Concrete Reinforcement Systems		X										X											
83			03200, 1.2	Reinforcing Steel							X					X											
84			03250, 1.2	Waterstops		X										X											
85			03250, 1.2	Pre-formed Compressible Joint Filler, Sealant and Waterstops			X									X											
86			03250, 1.2	PVC and Expanding Waterstops and Splices				X								X											
87			03250, 1.2	Pre-formed Compressible Joint Filler, Sealant and Waterstops							X					X											
88			03300, 1.2	Mixture Proportions					X							X											
89			03300, 1.2	Testing and Inspection for Contractor Quality Control						X						X											

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
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90			03410, 1.7	Pre-Cast Concrete Shop Drawings, layout, unit locations, fabrication details, unit identification marks, reinforcement, connection details, support items		X										X												
91			03410, 1.7	Product Data, indicating standard component configurations, design loads, deflections, cambers, and bearing requirements			X									X												
92			03410, 1.7	Design Data, including design loads, deflections, cambers, bearing requirements, and special conditions					X							X												
93			05120, 1.3	Shop Drawings, including profiles, sizes, spacing, locations of structural members, openings, attachments, fasteners, connections not detailed, cambers, welded connections and net welded lengths		X										X												
94			05120, 1.3	Manufacturer's Mill Certificate							X					X												
95			05120, 1.3	Welders' Certificates							X					X												
96			05520, 1.6	Profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories		X										X												
97			05531, 1.6	Indicate details of component supports, openings, perimeter construction details, and tolerances.		X										X												
98			05531, 1.6	Indicate welded connections using standard ANSI/AWS A2.4 welding symbols. Indicate net weld lengths		X										X												
99			05531, 1.6	Provide span and deflection tables			X									X												
100			05531, 1.6	Indicate special installation instruction requirements for perimeter framing						X						X												
101			10100, 1.2	Sign Materials, Sign Supports			X									X												
102			10100, 1.2	Traffic Control Police Detail Invoices											X		X											
103			11000, 1.3	Downriver Pipe Arrangement Plan, showing main pipe layout, the pipe restraint and anchoring system, including any pipe fittings, intended method of arranging both 54-inch mains around each anticipated work area, potential pipe-anchoring requirements, pipe-bending restrictions, and design of outlet struction including anchoring and erosion protection.	X											X												
104			11000, 1.3	Literature, drawings, materials of construction, list of manufacturer's recommended spare parts for each item and detailed sketch of the pipe anchoring system.		X											X											
105			11800, 1.3	Operations and Maintenance Manual Addenda										X			X											

SECTION 01340

CONSTRUCTION SURVEYS

PART 1 GENERAL

General Contractor shall conduct construction layout surveys and elevation surveys as required to facilitate the progress of excavation, verify that appropriate excavation depths have been reached to ensure the removal of contaminated material (TSCA and non-TSCA) and restoration of excavated areas in accordance with project requirements, and document volumes of material removed and replaced for purposes of payment. Surveys shall be performed at required depth intervals starting at the existing grade, down to intermediate excavation depths, final excavation grade, and final restored grade both within the river and on the riverbanks. Excavation Subcontractor shall check cut grades as necessary to allow progression of excavation, and shall coordinate with the General Contractor to acquire verification of cut grades by the General Contractor's surveyor.

1.1 REFERENCES

Section 6.03 Construction Layout Surveys, Massachusetts Board of Registration of Professional Engineers and Land Surveyors

1.2 DESCRIPTION OF WORK

For each distinct work cell, the survey tasks listed in the paragraphs below shall be conducted.

1.2.1 The General Contractor shall conduct an existing conditions survey on the banks and in the riverbed in each cell. The survey shall be conducted as cross sections at a minimum frequency of 25 feet and at obvious topographic anomalies. Stake out the limits of excavation, stake out the limits of TSCA/non-TSCA areas of excavation, stake out retaining wall locations and stake out the limits of the containment cells. These points are shown on the drawings. Generate CAD generated cross-sections every 25 feet showing the bank from limit of excavation across the cell to the center line sheet pile wall. Provide corresponding map of the cell and table with all points and elevations. The General Contractor shall be asked to survey the banks and riverbed, before the cell is dewatered, and generate the cross sections. Once the cell is dewatered, any areas which could not be surveyed prior to dewatering shall be surveyed and these data added to complete the cross sections.

1.2.2 The General Contractor shall review the cross sections and existing condition data, and confirm the required cut and fill elevations. The General Contractor shall generate new cross sections and a table showing existing grade, proposed cut, and proposed final

restored grade. This information shall be submitted to the Government for review and approval.

1.2.3 Once proposed cuts and restored grades are approved, the General Contractor shall identify cut lines in the field for the excavation, including delineation of TSCA and non-TSCA areas. The Excavation Subcontractor shall check conformance with the identified cut grades as the excavation is progressing using a laser level or other similar equipment. When these areas are excavated, the Excavation Subcontractor shall notify the General Contractor, and the General Contractor shall field survey cut grades at the original survey points in the cell. The General Contractor shall then provide an updated table with the surveyed cut grades for the cell for review by the Government. This shall include selected interim surveys where TSCA material is being removed as part of the excavation, to verify complete removal.

1.2.4 Upon approval of the final cut elevations by the General Contractor and the Government, the General Contractor shall immediately stake out backfill grades to allow backfilling to commence. As with the excavation, the Excavation Subcontractor shall check conformance with the identified backfill grades as the backfilling is progressing using a laser level or other similar equipment. Once backfilling is complete, the General Contractor shall survey the final elevations at the same point grid used for the original existing conditions survey for approval by the General Contractor and the Government. The General Contractor shall then provide the updated table for the cell showing actual final elevations. The Excavation Subcontractor must allow for a review period of 1 work day between completion of all surveys and Government approval of those surveys.

1.2.5 The General Contractor shall collect sufficient survey data to allow accurate calculation of in-place volumes of TSCA and non-TSCA material for purposes of payment and verification of OPCA disposal requirements. The General Contractor shall collect sufficient survey data to allow accurate calculation of in-place volumes of each type of backfill material used for restoration for purposes of payment.

1.2.6 General Contractor shall set cut and fill stakes or provide markings on installed sheet pile sections for the Excavation Subcontractor. Excavation Subcontractor is required to protect stakes. Elevation information shall be collected at the same points for all surveys conducted starting with the initial topographic survey, the final excavation survey, the final restoration survey, and intermediate elevation surveys as appropriate.

1.3 SUBMITTALS

Government approval is required for submittals with a “G” designation; submittals not having a “G” designation are for information only. When used, a designation following the “G” designation identifies the office that shall review the submittal for the

Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES AND REGISTER:

SD-06 Test Reports

Cell by Cell Survey Reports – Cell by Cell reports for pre-excavation elevations, post-excavation/pre-restoration elevations, and post-restoration elevations; G

PART 2 PRODUCTS

(NOT APPLICABLE)

PART 3 EXECUTION

3.1 DELIVERABLES

3.1.1 Survey data shall be compiled and presented in the form of mapping and tabular data and provided to the Engineer for each excavation cell.

3.1.2 Survey mapping shall be presented in the form of drawing sheets (24-inch by 36-inch sheets) at a scale of 1 inch to 20 or 30 feet. In addition, details shall be provided as necessary to document intricate or critical features.

3.1.3 Survey mapping shall also be provided as a seamless electronic drawing file as well as electronic files for each drawing sheet. The electronic files shall be generated in AutoCAD Release 14 (AutoCAD 2000 is acceptable but not required.) Drawing entities shall have x,y,z coordinates coinciding with actual State Plane/NAVD northing, easting, and elevation coordinates. Entities shall be placed on descriptive layers coinciding with the type of data. Drawings generated using Softdesk 8 through Land Development Desktop 2 are preferred and, if this software is used, the supporting project files shall be provided.

3.1.4 Survey point data shall be delivered in two forms: photocopies of applicable pages of field books and as electronic tabular files. Electronic files shall provide the adjusted northing, easting, elevation, and description of each survey point. These files shall be comma delimited ASCII or Excel 97 files.

3.2 STANDARDS

Work shall reference the Massachusetts State Plane Coordinate System. Horizontal control shall be in accordance with NAD 1983 and vertical control shall be in accordance with NAVD 1988 and based on USGS benchmarks as necessary.

Work shall conform to professional standards for Land Surveyors and applicable local and state laws, standards, and regulations. Unless noted otherwise, all other survey efforts shall be performed to a minimum accuracy of plus or minus 0.10 feet vertical and 1 in 10,000 horizontal.

To the extent possible, survey work shall be performed based on the existing horizontal and vertical control points as identified on the drawings. Electronic files containing this information are available.

END OF SECTION

SECTION 01355

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 REFERENCES

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

CODE OF FEDERAL REGULATIONS (CFR)

33 CFR 328	Definitions
40 CFR 68	Chemical Accident Prevention Provisions
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 279	Standards for the Management of Used Oil
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 355	Emergency Planning and Notification
49 CFR 171 - 178	Hazardous Materials Regulations

CODE OF MASSACHUSETTS REGULATIONS (CMR)

310 CMR 30	Hazardous Waste Regulations
310 CMR 40	Massachusetts Contingency Plan

ENGINEERING MANUALS (EM)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

U.S. ARMY CORPS OF ENGINEERS TECHNICAL REPORT

WETLAND MANUAL	Corps of Engineers Wetlands Delineation Manual Technical Report Y-87-1

PITTSFIELD SSERC DOCUMENTS

REPORT	Engineering Evaluation/Cost Analysis for the Upper Reach of the Housatonic River (February and July 2000)
REPORT	Addendum to the Engineering Evaluation/Cost Analysis for the Upper Reach of Housatonic River (October 2000)
REPORT	USEPA, Combined Action and EE/CA Approval Memorandum Addendum. Re: Request to Conduct a Removal Action at the GE-Housatonic River (Upper Reach Removal Action), Pittsfield, MA. May 26, 1998
REPORT	USEPA, Action Memorandum and Exemption from the Statutory $2,000,000 and 12-Month Limits on Removal Actions. Re: Request for Removal Action, Housatonic River 1.5-Mile Reach at the GE-Housatonic River Site, Pittsfield, MA. November 21, 2000.

1.2 DEFINITIONS

1.2.1 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally, and/or historically.

1.2.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; and radiant energy and radioactive material as well as other pollutants.

1.2.3 Excavation Subcontractor-Generated Hazardous Waste

Excavation Subcontractor-generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on-site by the Excavation Subcontractor or his subcontractors to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e., methyl

ethyl ketone, toluene, etc.), waste thinners, excess paints, excess solvents, waste solvents, and contaminated equipment rinse water.

1.2.4 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "waters of the United States" and discharges shall comply with project ARARs.

1.2.5 Waters of the United States

All waters that are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

1.2.6 Wetlands

Wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and bogs. Official determination of whether or not an area is classified as a wetland must be done in accordance with applicable federal, state, and local regulations.

1.3 GENERAL REQUIREMENTS

For all on-site activities, the General Contractor, the Excavation Subcontractor, and all other subcontractors shall, to the extent practicable, comply with the substantive portions of all applicable and relevant and appropriate Federal and State environmental laws and regulations (ARARs) as described in the ARARs table (included in the Final EE/CA and provided in Attachment 1 to these Specifications) for all on-site activities and meet all requirements of all applicable environmental Federal, State, and local laws and regulations for off-site activities. For ARARs that are encountered during the Removal Action that are not specifically addressed in the attached ARARs table, a similar process will be followed. For all off-site activities, the General Contractor, the Excavation Subcontractor, and all other subcontractors shall comply with all applicable environmental Federal, State, and local laws and regulations. Pursuant to Section 121(e) of CERCLA, the General Contractor, the Excavation Subcontractor, and all other subcontractors will not be required to obtain any Federal, State, or local permits for work conducted on-site.

1.4 SUBCONTRACTORS

The Excavation Subcontractor shall ensure compliance with this section by Subcontractors.

1.5 SUBMITTALS

The following submittals will be made in accordance with Section 01330, Submittal Procedures:

SD-01 Preconstruction Submittals:

Environmental Protection Plan- The General Contractor shall submit an Environmental Protection Plan (EPP) for the project. The plan will be a supplement to the Phase 1 EPP and will include a description of how the General Contractor and his subcontractors will meet, to the extent practicable, the substantive portions of all the applicable or relevant and appropriate Federal and State environmental laws and regulations (ARARs) as described in the ARARs table for all on-site activities and meet all requirements of all applicable environmental Federal, State, and local laws and regulations for off-site activities.

1.6 PROTECTION FEATURES

Prior to start of any on-site construction activities, and in association with the video survey described in Section 01410, the General Contractor and the Contracting Officer shall make a joint condition survey. The General Contractor shall include in the Environmental Protection Plan a section describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection, along with the condition of trees, shrubs, and grassed areas immediately adjacent to the site of work and adjacent to the General Contractor's and his subcontractors' assigned storage area and access route(s), as applicable. The General Contractor and his subcontractors shall protect those environmental features included in the plan and any indicated on the drawings, regardless of interference which their preservation may cause to the General Contractor's and his subcontractors' work under the contract.

1.7 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations, requested by the Excavation Subcontractor, from the drawings, plans, and specifications that may have an environmental impact will be subject to approval by the General Contractor and may require an extended review, processing, and approval time. The Contracting Officer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Contracting Officer determines that the proposed alternate method will have an adverse environmental impact.

1.8 NOTIFICATION

The Contracting Officer will notify the General Contractor in writing of any observed noncompliance by the General Contractor or any subcontractor on the site with Federal, State, or local environmental laws or regulations, permits, and other elements of the General Contractor's Environmental Protection Plan. The General Contractor shall, after receipt of such notice, inform the Contracting Officer of the proposed corrective action, which will include actions to be taken by subcontractors, and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or equitable adjustments allowed to the General Contractor or his subcontractors for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 ENVIRONMENTAL PERMITS AND COMMITMENTS

The General Contractor and his subcontractors shall be responsible for complying with, to the extent practicable, substantive portions of all environmental commitments as described in the attached ARARs table. Pursuant to Section 121(e) of CERCLA, however, the General Contractor and his subcontractors will not be required to obtain any Federal, State, or local environmental permits for work conducted on-site. Any applicable permits shall be required for off-site work.

3.2 LAND RESOURCES

The General Contractor and his subcontractors shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, the General Contractor shall identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the General Contractor and his subcontractors shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized by the Government. The General Contractor and his subcontractors shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Stone, soil, or other materials displaced into uncleared areas shall be removed by the Excavation Subcontractor.

3.2.1 Work Area Limits

Prior to commencing construction activities, the General Contractor shall inform the Excavation Subcontractor of areas that need not be disturbed under this contract. Temporary easements obtained by the Government are shown on the Drawings and indicate where work can be performed. Isolated areas within the general work area that are not to be disturbed shall be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. The General Contractor's and the Excavation Subcontractor's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

Unless authorized by the Government, no transport of contaminated soil or sediment generated from work on the project will be permitted on public ways other than Cove Street, a section of East Street from Cove Street to Lyman Street, and a section of Lyman Street from East Street to the entrance to GE's Lyman Street Parking Lot. If contaminated soils or sediments are transported on public ways, manifesting and/or other shipping papers may be required. Contaminated material transported on East Street shall require hazardous waste licensed trucks and drivers. Contaminated soil and sediment will be transported to a staging area, then to the GE OPCAs, or as approved by the Government or their representative, directly to the GE OPCAs from the excavation point. Transport to the GE OPCAs and the staging areas will be on roads as indicated in a Traffic Control Plan to be prepared by the General Contractor. Transport of project-related contaminated material or solid waste off-site will be conducted only upon authorization by the Government.

3.2.2 Erosion and Sediment Controls

The Excavation Subcontractor shall be responsible for providing erosion and sediment control measures that are, to the extent practicable, in accordance with Federal and State laws and regulations (see attached ARARs table). The area of bare soil exposed at any one time by construction operations should be kept to a minimum. The Excavation Subcontractor shall construct or install temporary and permanent erosion and sediment control best management practices (BMPs). BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. The Excavation Subcontractor's best management practices shall be in accordance with the requirements outlined in the attached ARARs table. Any temporary measures shall be removed after the area has been stabilized.

3.2.3 Excavation Subcontractor Facilities and Work Areas

The Excavation Subcontractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Excavation Subcontractor

facilities shall be made only when approved. Erosion and sediment controls shall be provided for on-site borrow and spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas shall be controlled to protect adjacent areas.

3.3 WATER RESOURCES, STREAM CROSSINGS, AND WETLANDS

The General Contractor and the Excavation Subcontractor shall monitor construction activities to prevent or minimize, to the extent practicable, pollution of surface and ground waters. All on-site construction activities, including those in the Housatonic River and associated stream crossings and wetlands, shall be performed in accordance with the attached ARARs table.

3.4 AIR RESOURCES

Equipment operation, activities, or processes performed by the Excavation Subcontractor shall be in accordance with, to the extent practicable, substantive portions of all Federal and State air emission and performance laws and standards (see attached ARARs table).

3.4.1 Particulates

Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials shall be controlled at all times, including weekends, holidays, and hours when work is not in progress. The Excavation Subcontractor shall maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates that would cause the Federal and State air pollution standards to be exceeded or that would cause a hazard or a nuisance (see attached ARARs table). The Excavation Subcontractor shall comply with all State visibility regulations.

3.4.2 Odors

Odors from construction activities shall, to the extent practicable, be controlled at all times. The odors shall not cause a health hazard and shall be in compliance with State regulations and/or local ordinances.

3.4.3 Sound Intrusions

The Excavation Subcontractor shall keep construction activities under surveillance and control to minimize environmental damage by noise. The Excavation Subcontractor shall comply with the provisions of the Commonwealth of Massachusetts rules and applicable City of Pittsfield ordinances.

3.5 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes shall be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

3.5.1 Solid Wastes

Solid wastes (excluding clearing debris) shall be placed in containers that are emptied on a regular schedule. Handling, storage, and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste.

3.5.2 Chemicals and Chemical Wastes

Chemicals shall be dispensed, ensuring no spillage to the ground or water. Periodic inspections of dispensing areas to identify leakage and initiate corrective action shall be performed and documented. This documentation will be periodically reviewed by the Government. Chemical waste shall be collected in corrosion-resistant, compatible containers. Collection drums shall be monitored and removed to a staging or storage area when contents are within 6 inches of the top. Wastes shall be classified, managed, stored, and disposed of in accordance with the requirements of the attached ARARs table.

3.5.3 Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. The General Contractor and all of his subcontractors shall, at a minimum, manage and store hazardous waste in compliance with the substantive requirements of 40 CFR 262 (see attached ARARs table). Hazardous wastes/materials as defined in this section do not include soil and sediment removed from the excavation areas or other remediation wastes such as concrete, debris, stumps, wood chips, wastewater treatment residuals, and personal protective equipment (PPE) generated by the removal action. The General Contractor and his subcontractors shall take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. The General Contractor and, as applicable, his subcontractors shall segregate hazardous waste from other materials and wastes, shall protect it from the weather by placing it in a safe covered location, and shall take precautionary measures such as berming or other appropriate measures against accidental spillage. The General Contractor and his subcontractors shall be responsible for storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 – 178 and State regulations. The General Contractor and his subcontractors shall transport project-generated hazardous waste off the site within 90 days in accordance with USEPA and DOT laws and regulations. On-site, the General Contractor shall dispose of all hazardous waste in accordance with the attached ARARs table. Off-site, the General Contractor and his

subcontractors shall dispose of hazardous waste in compliance with Federal, State, and local laws and regulations. The Excavation Subcontractor shall dispose of all wastes generated from the water treatment system in accordance with project ARARs. Spills of hazardous or toxic materials shall be immediately reported to the Contracting Officer. Cleanup and cleanup costs due to spills shall be the General Contractor's responsibility. The disposition of General Contractor-generated hazardous waste and excess hazardous materials are the General Contractor's (and, as applicable, his subcontractor's) responsibility. The General Contractor shall coordinate the disposition of hazardous waste with the Government.

3.5.4 Fuel and Lubricants

Storage, fueling, and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants, and oil shall be managed and stored in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed of in accordance with 40 CFR 279, State, and local laws and regulations.

3.6 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

The General Contractor, the Excavation Subcontractor and any other subcontractors shall protect existing historical, archaeological, and cultural resources within the work area and shall be responsible for their preservation during the life of the Contract. If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments; pavings, wall, or other constructed features; and any indication of agricultural or human activities. Upon such discovery or find, the General Contractor, the Excavation Subcontractor and any other subcontractors shall immediately notify the Government so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. The General Contractor, the Excavation Subcontractor and any other subcontractors shall cease all activities that may result in impact to or the destruction of these resources. The General Contractor, the Excavation Subcontractor and any other subcontractors shall secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

3.7 BIOLOGICAL RESOURCES

The General Contractor and his subcontractors shall minimize interference with, disturbance to, and damage to fish, wildlife, and plants outside the excavation areas, including their habitat. The General Contractor and his subcontractors shall be

responsible for the protection of threatened and endangered animal and plant species, including their habitat in accordance with the attached ARARs table.

3.8 PREVIOUSLY USED EQUIPMENT

The Excavation Subcontractor shall clean all previously used construction equipment prior to bringing it onto the project site. The Excavation Subcontractor shall ensure that the equipment is free of soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. The Excavation Subcontractor shall consult with the USDA jurisdictional office for additional cleaning requirements.

3.9 TRAINING OF PERSONNEL

The General Contractor and his subcontractors' personnel shall be trained in all phases of environmental protection and pollution control in accordance with the Project Health and Safety Plan and applicable OSHA requirements. The General Contractor and the Excavation Subcontractor shall conduct environmental protection/pollution control meetings for all General Contractor and all subcontractor personnel prior to commencing construction activities. Additional meetings shall be conducted for new personnel and when site conditions change. The training and meeting agenda shall include: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

3.10 POST-CONSTRUCTION CLEANUP

The Excavation Subcontractor shall conduct post-construction cleanup in accordance with the requirements of the drawings and specifications and the Consent Decree. The Excavation Subcontractor shall, unless otherwise instructed in writing by the General Contractor or indicated in the drawings, specifications, or the Consent Decree, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Disturbed areas shall be graded, filled, and the entire area seeded unless otherwise indicated. Specific requirements relative to restoration of disturbed areas may be imposed by the Government based on negotiations with individual property owners.

END OF SECTION

SECTION 01410

ENVIRONMENTAL AND CONDITIONS MONITORING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced.

CODE OF FEDERAL REGULATIONS (CFR)

33 CFR 328 Definitions

40 CFR 50, Appendix B USEPA Reference Method for the Determination of Suspended Particulates (TSP) in the Atmosphere (High Volume Method)

40 CFR 300.430(e)(9) of the National Contingency Plan.

40 CFR 355 Emergency Planning and Notification

ENGINEERING MANUALS (EM)

EM 385-1-1 (1996) U.S. Army Corps on Engineers Safety and Health Requirements Manual

EP 1110-1-21 Air Pathway Analysis (APA) for the Design of HTRW Remedial Action Project.

EPA TECHNICAL DOCUMENTS (TO)

EPA/625/R-96/010b Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air - Second Edition - Compendium Method TO-4A Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using High Volume Polyurethane Foam (PUF) Sampling Followed by Gas Chromatographic/Multi-Detector Detection (GC/MD)

PROJECT PLANNING AND GUIDANCE DOCUMENTS

Final Quality Assurance Project Plan (QAPP), Roy F. Weston, Inc., General Electric Housatonic River Project, Contract No. 68-W7-0026, DCN: RFW033-2E-AEOQ, November 2000.

Monitoring Plans, 1.5-Mile Removal Action – Phase 1, Roy F. Weston, Inc., Environmental Remediation Contract General Electric/ Housatonic River Project, Pittsfield, MA, Contract No. DACW33-00-D0006, Task Order No. 0005, DCN: GE-060302-ABAU, June 2002.

Final Quality Assurances Project Plan (QAPP), Volumes I, II, IIA, and IV, Roy F. Weston, Inc., DCN: GE-021601-AAHM, March 2001.

Final Quality Assurance Project Plan (QAPP), Volume III, and IV, Roy F. Weston, Inc., DCN: GEP2-123098-AAET, January 1999, and DCN: GEP2-060499-AAIY, October 1999.

Draft Field Sampling Plan (FSP), Roy F. Weston, Inc., Environmental Remediation Contract General Electric/ Housatonic River Project, Pittsfield, MA, Contract No. DACW33-00-D0006, Task Order No. 0002, DCN: GE-091200-AADI, November 2000.

Final Field Sampling Plan (FSP), Roy F. Weston, Inc., DCN: GE-053001-AAMA, 30 July 2001.

Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), USEPA, May 1987.

On-Site Meteorological Program Guidance for Regulatory Modeling Applications.

Summary of Structural Conditions and Utility Survey from Lyman St. Bridge to Elm St. Bridge along Housatonic River, Pittsfield, Massachusetts, Hart Crowser, September 28, 2000.

1.2 GENERAL REQUIREMENTS

The General Contractor shall perform monitoring during the construction work being performed in the Phase ½ Transition Area of the 1.5-Mile Reach of the Housatonic River and surrounding area to identify and mitigate conditions that may result in increased risks to the local community, the ecological receptors, or the environment. In addition, the General Contractor shall perform monitoring of buildings and structures in the vicinity of the construction work to identify any adverse affects that may have resulted from the construction activities. This specification is not intended to address health and safety of the construction workers. Construction worker health and safety shall be addressed in the Site Safety and Health Plan for the project.

The monitoring activities that shall be performed include:

1. Air Monitoring: Sampling and analysis of ambient air for PCBs and PM_{10} (particulates 10 microns and less).

2. Water Column Monitoring: Sampling and analysis of surface water upstream and downstream of the work area in the Housatonic River.

3. Noise Monitoring: Monitoring the noise created by construction activities directly adjacent to work areas.

4. Settlement Monitoring: Monitoring the elevations of designated points on the foundations of local buildings and structures.

5. Vibration Monitoring: Monitoring of the intensity of vibrations in local buildings and on local structures as the result of sheet pile driving and other construction activities.

6. Conditions Monitoring: Video documentation of the conditions of local structures and environmental conditions before commencement of construction work and at the conclusion of the construction work. Maintain one working copy and one archive copy of the initial and final video surveys.

1.3 QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

All work included in the specification shall comply with Volume I (Sections A-D) and Appendices A and B of the SSERC Project QAPP.

Standard Operating Procedures (SOPs) for field screening instruments, decontamination, documentation, sampling, sample identification, sample packing and shipping, and surveying are included in the FSP. The following is a list of SOPs that shall be followed for Environmental and Conditions Monitoring:

SOP No.	Task
G-1	Calibration of Field Screening Instruments
G-2	Decontamination
G-3	Field Documentation
G-4	Field Filtration
G-5	Field Measurements
G-6	Field Sample Numbering
G-7	Management of Investigation Derived Wastes (IDW)
G-9	Quality Assurance/ Quality Control Sampling
G-10	Sample Documentation
G-11	Sample Packing and Shipping
G-12	Surveying

Additional SOPs for specific activities are referenced in the sections below.

1.4 SUBMITTALS

Government approval is required for submittals with a “G” designation; submittals not having a “G” designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Ambient Air Monitoring Plan Supplement; G
Water Column Monitoring Plan Supplement; G
Noise Monitoring Plan; G
Settlement Monitoring Plan Supplement; G
Vibration Monitoring Plan Supplement; G
Conditions Monitoring Plan Supplement; G

SD-02 Shop Drawings

Manufacturer's Cut Sheets of Vibration Monitoring Devices; G
Manufacturer's Cut Sheets of Noise Monitoring Devices; G

SD-06 Test Reports

Air Monitoring Daily Report: G
Monthly Project Report – Includes Air, Water Column, Noise, and Vibration Monitoring Results; G.
Water Column Monitoring Daily Report; G

SD-11 Closeout Submittals

Final Project Monitoring Report – Summary of Air, Water Column, Noise, Settlement, Vibration and Conditions Monitoring Program Results; G.

1.5 AIR MONITORING

1.5.1 Ambient Air Monitoring Plan Supplement

Prior to commencing monitoring activities, the General Contractor shall submit an Ambient Air Monitoring Plan Supplement for review and approval by the Contracting Officer. The Ambient Air Monitoring Plan Supplement shall include, but shall not be limited to, the following:

a. A brief description of the sampling locations, schedule and frequency of sample collection, and the methods of sample collection and analysis.
b. Where applicable, references to methods and procedures outlined in the Project FSP and the Project QAPP.
c. Any variations from the methods and QA/QC presented in the FSP and QAPP shall be noted in the Ambient Air Monitoring Plan.

1.5.2 Air Monitoring Data Deliverables

Daily and Monthly Reports

A Daily Data Report shall be prepared summarizing each of the PM10 ambient air monitoring sampling events. The reports shall contain the following information:

- Map of the site detailing the location of the PM10 ambient air monitors. The site map shall also include the forecasted wind direction, comments on excursions, and any problems with sampling equipment.
- Wind rose for the sample period obtained from the United States Weather Page on the Internet for the Pittsfield area, navigate to http://www.uswx.com/us/wx/MA/01201/
- Summary graph of sample results for the sample period for each location. Summary table of the maximum instantaneous reading, the maximum 15-minute average, hourly average readings for the entire sampling period, and the overall sampling period average for each location.

For monthly PCB Air Monitoring, copies of the sample attribute forms completed shall be included in the daily report on the day the samples are collected.

An Air Monitoring section shall be included in the Monthly Project Report, and will summarize the PM_{10} and PCB ambient air sampling results. Each monthly Air Monitoring Report shall contain the following information:

PCB Monitoring

- Summary of PCB sampling events including the date of sampling, comments on excursions, problems with sampling equipment, site activities, laboratory problems, and results of samples.
- Site map detailing the location of sampling locations
- Summary table of results received in a given month.

PM_{10} Monitoring

- Summary of PM_{10} data for the month including daily average PM10 concentrations and total hours monitored for each PM10 monitoring location.

Final Air Monitoring Report

The Final Air Monitoring Report shall be a section of the Final Project Monitoring Report and shall include both PCB and PM_{10} ambient air monitoring data. The report shall contain the following information:

- Summary of the PCB and PM_{10} sampling events for the duration of the construction work (date and time of sampling, sampling locations, number of samples collected,

PCB analytical results or PM_{10} 10-hour average readings, and meteorological data summary). In addition, the sample dates, PCB analytical results and PM_{10} 10-hour average readings shall be summarized in an electronic data deliverable (EDD) as described in Subsection 5.4 of the QAPP.

- Calibration and Maintenance Activities.
- Discrepancies noted in the data.
- Summary of all notification level and action level excursions for both PCB and PM_{10} ambient air monitoring including date and time of sampling, sampling locations, and results.

1.6 WATER COLUMN MONITORING

1.6.1 Water Column Monitoring Plan

Prior to commencing monitoring activities, the General Contractor shall submit a Water Column Monitoring Plan for review and approval. The Water Column Monitoring Plan shall be a supplement to the Phase 1 Water Column Monitoring Plan, and shall include, but shall not be limited to, the following:

a. A brief description of the sampling locations, schedule and frequency of sample collection, and the methods of sample collection and analysis.
b. Manufacturer's cut sheets and a brief description of the automated sampling device to be utilized.
c. Where applicable, references to methods and procedures outlined in the Project FSP and the Project QAPP.
d. Any variations from the methods and QA/QC presented in the FSP and QAPP shall be noted in the Water Column Monitoring Plan.

1.6.2 Water Column Monitoring Data Deliverables

Daily and Monthly Reports

A Daily Water Column Monitoring Report shall be submitted summarizing calculated flow based on a rating curve correlated to the Coltsville gauge, hourly water temperature from each turbidity monitoring location, and turbidity measurements including daily averages for each location (upstream and downstream of construction activities). The daily report shall also note when turbidity levels exceeded applicable action levels, notification steps taken, and additional water column monitoring conducted. Sample attribute forms and a summary table for water column samples shall be submitted as part of the daily report on the day the samples are collected.

A Water Column Monitoring section shall be included in the Monthly Project Report, and will summarize the water column monitoring sampling events. The reports shall contain the following information:

- Summary of the PCB/TSS sampling events (conducted twice per month and on specific events) and daily monitoring activities including the date of sampling, comments on excursions, problems with sampling equipment, site activities, laboratory problems, and results of samples).

- Summary table of results for turbidity measurements for the month including daily average, maximum, and minimum turbidity measurements for each location (upstream and downstream), and daily flow from the Coltsville gauging station,

- Summary table of PCB/TSS sampling including any results available at the time of submittal, date samples were collected, flows from Coltsville location and each of the sampling locations, water temperatures from each sampling location, correlated turbidity measurements including high, low, and average readings from the day of each sampling event, and any additional PCB/TSS sampling conducted during the period.

- Summary of all action level excursions for PCBs and turbidity including date and time of sampling, sampling locations, and results.

- The initial laboratory reports.

Final Water Column Monitoring Report

The Final Water Column Monitoring Report shall be prepared which summarizes the water column monitoring sampling events. The report shall contain the following information:

- Summary of the water column monitoring sample events for the duration of the construction work (date and time of sampling, sampling locations, number of samples collected, water quality results, and PCB and TSS analytical results). In addition, the sample dates and analytical results shall be summarized in an electronic data deliverable (EDD) as described in Subsection 5.4 of the QAPP.

- Calibration and Maintenance Activities.

- Discrepancies noted in the data.

- Summary of all action level excursions for PCBs and turbidity including date and time of sampling, sampling locations, and results.

1.7 NOISE MONITORING

1.7.1 Noise Monitoring Plan

Prior to commencing monitoring activities, the General Contractor shall submit a Noise Monitoring Plan for review and approval. The Noise Monitoring Plan shall include, but shall not be limited to, the following:

a. A brief description of the monitoring locations and the monitoring methods to be used.

b. Shop drawings of the noise monitoring devices.

c. An example spreadsheet layout of the data deliverable.

1.7.2 Noise Monitoring Data Deliverables

Monthly Reports

A Monthly Noise Monitoring Report shall be prepared as a section of the Monthly Project Report, and shall summarize the results of noise monitoring. The report shall contain the following information:

- Summary of the monitoring events including problems with sampling equipment and site activities.

- Summary table and/or graph of noise monitoring results reported as daily averages.

Final Noise Monitoring Report

A Final Noise Monitoring Report section shall be included in the Final Project Monitoring Report, and shall summarize the noise monitoring data for all construction activities. The report shall contain the following information:

- Description of the monitoring locations.

- Summary table and/or graph of noise results for the duration of the construction activities.

In addition, these data shall be summarized in an electronic data deliverable (EDD) as described in Subsection 5.4 of the QAPP.

1.8 SETTLEMENT MONITORING

1.8.1 Settlement Monitoring Plan Supplement

Prior to commencing monitoring activities, the General Contractor shall submit a Settlement Monitoring Plan Supplement for review and approval. The Settlement Monitoring Plan Supplement shall include, but shall not be limited to, the following:

a. A brief description of the survey locations and the survey methods to be used.
b. Manufacturer's cut sheets on the Deformation Monitoring Points (DMPs).
c. An example of the data deliverable format.

1.8.2 Settlement Monitoring Initial Report

An Initial Settlement Monitoring Report shall be prepared summarizing the initial survey results. The report shall contain the following information:

- Name and description of the structure surveyed.
- Physical location description of the survey point.
- Coordinates and elevation of the survey point.

In addition, these data shall be summarized in an electronic data deliverable (EDD) as described in Subsection 5.4 of the QAPP.

1.8.3 Settlement Monitoring Final Report

A Final Settlement Monitoring Report section shall be included in the Final Project Monitoring Report, and shall summarize the final survey results. The report shall contain the following information:

- Name and description of the structure surveyed.
- Physical location description of the survey point.
- Coordinates and elevation of the survey point.
- Location discrepancies between the initial and final survey points.

The surveyed elevation data shall presented in spreadsheet format and shall be clearly catalogued by the name of the structure surveyed, the location on the structure (i.e., middle of east foundation wall, 2 feet from ground surface, etc.) and the x and y coordinates of the specific survey point. Data shall be provided in State Plane Coordinates. In addition, this data shall be summarized in an electronic data deliverable (EDD) as described in Subsection 5.4 of the QAPP.

1.9 VIBRATION MONITORING

1.9.1 Vibration Monitoring Plan Supplement

Prior to commencing monitoring activities, the General Contractor shall submit a Vibration Monitoring Plan Supplement for review and approval. The Vibration Monitoring Plan Supplement shall include, but shall not be limited to, the following:

a. A brief description of the monitoring locations and the monitoring methods to be used.

b. Shop drawings of the vibration monitoring devices.

c. An example spreadsheet layout of the data deliverable.

1.9.2 Vibration Monitoring Data Deliverables

Monthly Reports

A Monthly Vibration Monitoring Report shall be prepared as a section of the Monthly Project Report, and shall summarize each monthly vibration monitoring event. The report shall contain the following information:

- Summary of the sampling events including problems with sampling equipment, exceedances of action levels, and site activities.

- Summary table of vibration monitoring results for each structure being monitored including the maximum particle velocity in inches per second every 6 hours.

Final Vibration Monitoring Report

A Final Vibration Monitoring Report section shall be included in the Final Project Monitoring Report, and shall summarize the vibration monitoring data for all construction activities. The report shall contain the following information:

- Description of the monitoring locations.

- Summary table of vibration monitoring results for the duration of the construction activities.

In addition, these data shall be summarized in an electronic data deliverable (EDD) as described in Subsection 5.4 of the QAPP.

1.10 CONDITIONS MONITORING

1.10.1 Conditions Monitoring Plan Supplement

Prior to commencing monitoring activities, the General Contractor shall submit a Conditions Monitoring Plan Supplement for review and approval. The Conditions Monitoring Plan Supplement shall include, but shall not be limited to, the following:

a. A brief description of the organizational outline of the videotape and locations to be videotaped.

1.10.2 Initial Conditions Survey Deliverable

An Initial Conditions Survey videotape shall be prepared. The video shall document the condition of the local structures and locations along the river as described in Part 3. The video shall incorporate notes, labels, or signs to clearly indicate the location or structure being videotaped. The General Contractor shall keep a chain-of-custody of the Initial Conditions Survey videotape.

The format for the taping shall be as follows:

- Title on film showing the contract title and number, and the name and address shown on the film.
- A general view of the structure with a reference point established (i.e., right or left hand corner of the structure) audio and video recording record of exterior of the structure and surrounding grounds, outbuildings, pools, and fences. This record shall be maintained in the same direction in each case from the established reference point.
- The interior portions of the structure shall then be recorded in the same fashion from the same reference point. Every effort shall be made not to record personal property. A written log shall be maintained to pinpoint areas of interest such that it shall not be necessary to review the entire tape to view information on a particular structure.
- When the survey is complete, the General Contractor shall keep a copy in his files and provide 2 copies to the Government.

1.11 FINAL CONDITIONS SURVEY DELIVERABLE

A Final Conditions Survey videotape shall be prepared. The video shall document the condition of the local structures and locations along the river included in the Initial Conditions Survey. The video shall incorporate notes, labels, or signs to clearly indicate the location or structure being videotaped. The format for the taping shall be as described above for the initial video survey.

1.12 FINAL PROJECT MONITORING REPORT

The Final Project Monitoring Report will include summaries of all the project monitoring data as described in the above sections for the entire construction project. The Final Project Monitoring Report will be submitted in Draft form to the Government within 60 days of receipt of the final construction monitoring data. The Final Project Monitoring Report will be submitted in revised and submitted in final form within 30 days of receipt of comments on the draft report from the Government.

1.13 SECURITY

The General Contractor shall be responsible for security of all sampling equipment and sampling stations. Control of all persons performing maintenance of the sampling equipment and operating the sampling equipment shall be provided by the General Contractor.

The General Contractor shall maintain security provisions to assure that system failure, vandalism, or other incident will be addressed in a timely fashion.

1.14 APPENDICES

Copies of all raw data, certifications, calibration logs, and other pertinent documents shall be attached, as an appendix, to the plans and final reports, as appropriate.

PART 2 PRODUCTS

2.1 AMBIENT AIR MONITORING

2.1.1 PCB Monitoring

A high volume polyurethane foam (PUF) sampler utilizing sample media consisting of a glass fiber filter with a PUF backup absorbent cartridge drawing air at a rate of 0.20-0.280 m^3/min. (General Metal Works Model GPS-1 or equivalent) shall be used for monitoring PCB concentrations in ambient air. Sampling will be conducted based on USEPA's Organic (TO) Compendium of Methods for Air Toxics – Method TO-4A and SOP A-1.

Calibrations and maintenance shall be conducted at the frequency and in accordance with the procedures in the FSP SOP A-1. All calibration and maintenance activities shall be documented.

2.1.2 PM_{10} Monitoring

A MIE data RAM Model PDR-1200 real time PM_{10} monitor shall be used to monitor and record particulate concentrations with a mean diameter of 10 microns or less (PM_{10}). These instruments are not designated as USEPA reference methods for the collection and determination of PM_{10} as specified under 40CFR, Part 50, Appendix J. These instruments provide approximate measurement of the sum of particulates and aerosol PM_{10} concentrations.

Calibrations and maintenance shall be conducted at the frequency and in accordance with the procedures recommended by the manufacturer. All calibrations and maintenance activities shall be documented.

2.2 WATER COLUMN MONITORING

Surface water sampling equipment appropriate for automated grab and composite sampling of river water shall be utilized. The sampling shall utilize the techniques described in the FSP and relevant WESTON SOPs.

2.3 NOISE MONITORING

An Extech Model 407764 Sound Level Meter or equivalent shall be used to monitor noise levels adjacent to the areas of construction. Calibrations and maintenance shall be conducted at the frequency and in accordance with the procedures recommended by the manufacturer. All calibrations and maintenance activities shall be documented.

2.4 SETTLEMENT MONITORING

Standard land surveying equipment shall be used to monitor elevations of designated points on structures as described in Part 3. Deformation Monitoring Points (DMPs) shall be used to monitor vertical and/or horizontal deformation of various facilities at selected locations as described in Part 3. The DMPs shall include a 5/16-inch diameter by 1½-inch long stainless steel socket-head cap bolt, screwed into a 1-inch long by 5/16-inch diameter tamp-in screw anchor. A 4-inch (or longer) bolt may be used at locations where overhanging obstructions prevent the placement of the level rod on the DMP. A 5/16-inch diameter by ¾-inch-long carriage bolt shall replace the 1½-inch-long socket-head bolt when readings are not being taken. These tamp-in screw anchors shall typically be installed into vertical surfaces of buildings and structures.

2.5 VIBRATION MONITORING

BlastMate Series III vibration monitoring equipment manufactured by Instantel, Inc., or equivalent, shall be used for the vibration monitoring described in Part 3.

- Seismic range: 0.01 to 8 inches per second with an accuracy of 5% and no more than a 3 dB roll off at the low frequency end.

- Flat frequency response: 2 to 200 Hz.

- Three component sensor.

- Two power sources: Internal rechargeable battery and charger and 115 volts AC. Battery shall be capable of supplying power to monitor vibrations continuously for up to 1 week.

- Sufficient memory to allow vibration data to be collected continuously for a minimum of 1 week before downloading.

- Capable of internal dynamic calibration.

- Direct writing to printer and electronic storage media. Instruments shall be capable of producing strip chart recordings of readings on site within 1 hour of obtaining the readings. Provide computer software to perform frequency analyses of data obtained on electronic storage media.

- Continuous monitoring mode shall be capable of recording peak velocities

2.6 CONDITIONS MONITORING

A standard VHS video camera and VHS videotape shall be used to document the structural and environmental conditions of the structures and areas identified in Part 3.

PART 3 EXECUTION

3.1 AMBIENT AIR MONITORING

For the protection of public health, the General Contractor shall monitor and control contaminant emissions to the air from HTRW remedial action area sources to minimize short term risks that might be posed to the community during implementation of the remedial alternative in accordance with the FSP, the QAPP, and the following requirements. Results from perimeter air monitoring shall supplement on-site health and safety information in order to determine the need for and type of response actions. Results will also be used to determine the need for and evaluate corrective actions to address exceedances of applicable ambient air standards.

3.1.1 Perimeter Air Contaminant of Concern

Polychlorinated biphenyls (PCBs) and PM_{10}.

3.1.2 Time Averaged Perimeter Action Levels

Any excursions of either the notification levels or the action levels listed below shall be reported immediately to the Government, who will discuss the need for and type of response actions.

3.1.2.1 PCBs

Notification Level (Time-Weighted Average)

a. Concentration: 0.05 ug/m^3

b. Time: 24 hours

Action Level (Time-Weighted Average)

a. Concentration: 0.1 ug/m^3

b. Time: 24 hours

3.1.2.2 PM_{10}

Notification Level (Time-Weighted Average, 80% of 24-hour National Ambient Air Quality Standard (NAAQS) for PM_{10})

a. Concentration: 120 ug/m^3

b. Time: 10 hours

Action Level (Time-Weighted Average, 24-hour NAAQS for PM_{10})

a. Concentration: 150 ug/m^3

b. Time: 10 hours

These levels are more conservative than the NAAQS for PM_{10}, which average the instantaneous concentrations over a 24-hour period, rather than a 10-hour period. This level has been selected to allow notice to the Government before concentrations reach the level of the 24-hour NAAQS.

3.1.3 Sampling/Monitoring Locations

The purpose of this sampling program is to monitor levels of PCBs and particulates that migrate offsite; therefore, sampling stations shall be located at the perimeter of the site, on or near the property boundary. Samplers will be moved to new locations as construction-related activities progress. An additional monitor will be operated at an appropriate location in Pittsfield that is representative of background PCB concentrations. The specific sampling locations for these monitors will be determined at a later date.

3.1.4 Frequency of Sampling

Ambient air monitoring for PCBs shall be conducted for one 24-hour period every month during construction activities in the Housatonic River.

Real-time ambient PM_{10} monitoring shall be conducted during all construction related activities. Monitoring shall be performed for approximately 10 hours per day or as the length of the workday dictates. PM_{10} data shall be recorded and averaged by a datalogger for each hour of the day.

3.1.5 Monitoring Instruments/Sampling and Analysis Methods

3.1.5.1 PCBs

Method:	USEPA Compendium Method TO-4B, Method for the Determination of Organochlorine Pesticides and Polychlorinated Biphenyls in Ambient Air
Analytical Method:	USEPA Method 608/8088, with analysis for the following PCB Aroclors: 1016, 1221, 1232, 1242, 1248, 1254, and 1260.
Sampling Rate:	0.25 – 0.26 m^3/min.
Average Sample Volume:	370 m^3

3.1.5.2 PM_{10}

A MIE data RAM Model PDR-1200 real time PM_{10} monitor shall be used to monitor and record particulate concentrations with a mean diameter of 10 microns or less (PM_{10}). These instruments are not designated as USEPA reference methods for the collection and determination of PM_{10} as specified under 40CFR, Part 50, Appendix J. These instruments provide approximate measurement of the sum of particulates and aerosols PM_{10} concentrations.

3.1.5.3 Meteorological Monitoring

Meteorological data shall be obtained from the United States Weather Page on the Internet (http://www.uswx.com/us/wx/MA/01201/) for the Pittsfield area. Decoded observations for wind speed and direction shall be utilized in constructing daily wind rose diagrams.

3.1.6 Notification of Action Level Exceedances and Sampling for Evaluation of Corrective Actions

If action levels for PCBs or PM_{10} are exceeded, the Government shall be notified immediately. The General Contractor shall: (1) perform an evaluation of ongoing remediation activities to determine if engineering controls were properly implemented; (2) attempt to determine the cause of the exceedance; (3) consult with the Government in developing a plan of action for additional sampling and analysis, and in identifying corrective actions to be implemented in construction activities to address the issue. Development and implementation of the plan of action is not included in the scope of this specification. Scope and funding for plan of action development, corrective action implementation, and additional sampling in response to exceedances will be handled separately on a case-by-case basis.

3.2 WATER COLUMN MONITORING

The purpose of the Water Column Monitoring program shall be to identify, evaluate, and remedy any potential negative impacts to the Housatonic River that may result from remedial activities. The Water Column Monitoring shall be performed in accordance with the project FSP and QAPP, and the following.

3.2.1 Parameters of Concern

PCBs – Total and Dissolved
Turbidity
Total Suspended Solids (TSS)
Temperature
Water Flow
Stage Height

3.2.2 Action Levels

Any excursions of either the action levels listed below shall be reported to the Government immediately.

PCBs-Total (10 hour composite or 4 part grab): Downstream (Pomeroy Avenue) $\geq$ Upstream (Lyman Street)+ 5 ug/L

Turbidity: Downstream (Elm Street) $\geq$ Upstream (Lyman Street) + 50 NTU (13 Hour Daily Average)

3.2.3 Sampling/Monitoring Locations and Frequencies

A total of four sampling locations shall be included in the Water Column Monitoring Program as follows (with frequencies and types of sampling):

- Newell Street Bridge – Monthly PCB and TSS sampling plus water temperature and stage height measurement.
- Lyman Street Bridge – Daily turbidity; twice monthly PCB and TSS sampling plus water temperature.
- Elm Street Bridge – (until construction activities reach this location).
- Pomeroy Avenue Bridge – Daily turbidity; twice monthly PCB and TSS sampling plus water temperature and stage height measurement.

The daily turbidity monitoring location at the Elm Street Bridge (currently installed for Phase 1 construction activities) will have to be moved once construction activities begin for the Phase 1/2 Transition . The monitoring station will be moved to the Pomeroy Avenue Bridge location to monitor the downstream effects of construction activities on water column turbidity.

In addition, monitoring shall be performed at the Newell Street, Lyman Street, and Pomeroy Avenue monitoring stations for PCBs and TSS during approximately three specific events. For example, monitoring will be performed during the following: a high flow event, an excavation of NAPL-impacted sediments, sheet pile installation/removal, etc.

Water column monitoring shall be initiated once the first intrusive activities have commenced in the Housatonic River and shall continue to be performed for the duration of the removal and replacement activities in the river.

3.2.4 Sampling Procedures

Sample collection activities shall include standard methods for collection and analysis of samples at an off-site laboratory for total and dissolved PCBs. Activities shall follow the procedures outlined in Standard Operating Procedure SW-6 of the Addendum to the Final FSP dated September 2002 (DCN: GE-091102-ABES), revised September 2002. Flows shall be downloaded during each day of construction from the Coltsville records on the USGS web site.

Staff gage readings will be measured at the Newell Street and Pomeroy Avenue locations and converted to elevations during the beginning and end of each sampling events. Rating curves for each location will be used to determine the flows during that sampling event. River cross-sections and rating curves currently exist for both the Pomeroy Avenue and Newell Street location.

Composite samples shall be collected monthly at each location. At each station per sampling event, an ISCO sampler shall be utilized to collect a 10-hour (during construction) composite surface water sample. Sample collection shall be conducted according to procedures outlined in Standard Operating Procedure SW-6 of the Field Sampling Plan November 2000 (DCN: GE-091200-AADI), revised July 2001. However, in the event of extreme cold weather conditions or conditions that do not allow for normal sampling procedures to be utilized, four manual grab samples will be collected over the course of the work day and composited into one sample for PCB and TSS analysis.

Turbidity will be measured according to procedures outlined in Standard Operating Procedure SW-6 of the FSP.

Sample processing will follow the procedures outlined in Standard Operating Procedure SW-6 of the FSP. Any deviations from the procedures outlined in the FSP shall be noted in the Water Column Monitoring Plan and the Final Water Column Monitoring Report.

3.2.5 Notification of Action Level Exceedances and Sampling for Evaluation of Corrective Actions

If action levels for Total PCBs or Turbidity are exceeded, the Government shall be notified immediately. The General Contractor shall: (1) perform an evaluation of ongoing remediation activities to determine if engineering controls were properly implemented; (2) attempt to determine the cause of the exceedance; (3) consult with the Government in developing a plan of action for additional sampling and analysis, and in identifying corrective actions to be implemented in construction activities to address the issue. Development and implementation of the plan of action is not included in the scope of this specification. Scope and funding for plan of action development, corrective action implementation, and additional sampling in response to exceedances will be handled separately on a case-by-case basis.

3.2.6 Analytical Methods

The General Contractor shall follow the procedures for sample analysis and QA/QC as outlined in the Project QAPP. Any deviations from these procedures shall be noted in the Water Column Monitoring Plan and the Final Water Column Monitoring Report.

3.3 NOISE MONITORING

Noise monitoring will be conducted to meet the standards established in the City of Pittsfield Noise Ordinance. Noise levels produced by construction activities will be kept at or below a 65 decibel (dBA) average over the course of a workday. Instantaneous noise levels will also be monitored. Noise readings will be obtained at property boundaries adjacent to work areas as necessary.

3.3.1 Action Levels

Readings indicating exceedances of the 65-decibel daily average will be reported immediately to EPA, and an evaluation of construction activities will be conducted to determine potential corrective measures. Instantaneous exceedances or complaints from nearby residents will be evaluated accordingly.

3.3.2 Monitoring Locations

The purpose of this monitoring program is to monitor noise levels that may affect property owners adjacent to construction activities; therefore, monitoring stations shall be located at the perimeter of the site, on or near the property boundary. Monitors will be moved to new locations as construction-related activities progress. The specific locations for these monitors will be determined at a later date.

3.3.3 Frequency of Sampling

Real-time noise monitoring shall be conducted only as necessary or when noise levels created by construction-related activities are considered to be excessive per the Engineer. When noise monitoring is deemed necessary, monitoring shall be performed for approximately 10 hours per day or as the length of the workday dictates. Noise level data shall be recorded and averaged by a datalogger for each hour of the day.

3.3.4 Monitoring Instruments/Sampling and Analysis Methods

An Extech Model 407764 Sound Level Meter or equivalent shall be used to monitor noise levels adjacent to the areas of construction. Calibrations and maintenance shall be conducted at the frequency and in accordance with the procedures recommended by the manufacturer. All calibrations and maintenance activities shall be documented.

3.3.5 Notification of Action Level Exceedances

If action levels for noise levels are exceeded, the Government shall be notified immediately. The General Contractor shall: (1) perform an evaluation of ongoing remediation activities to determine if engineering controls were properly implemented; (2) attempt to determine the cause of the exceedance; (3) consult with the Government in developing a plan of action for additional monitoring, and in identifying corrective actions to be implemented in construction activities to address the issue. Development and implementation of the plan of action is not included in the scope of this specification. Scope and funding for plan of action development, corrective action implementation, and additional monitoring in response to exceedances will be handled separately on a case-by-case basis.

3.4 SETTLEMENT MONITORING

3.4.1 Structures to be Monitored

Three survey points shall be established on each of the following structures:

Building A: 10 Lyman Street
Building B: 55 Root Place
Building F: 103 Elm Street, Elm Street Laundromat
Building G: 14 Hathaway Street, Residence and In-Ground Pool
Lyman Street Bridge
53-59 Elm Street, Apartment Building and Garage
37 Elm Street, Harry's Supermarket and Billboards
103 Elm Street, Elm Street Self-Car Wash, including three vacuums at the top of bank
41 Root Place
48 Root Place
50 Root Place
50 Elm Street, including building and crib wall
Elm Street Bridge
Flow Deflection Structure for Culvert downstream of the Elm Street Bridge

3.4.2 Scheduling

Two elevation surveys shall be performed to identify settlement in the structures listed above. The first elevation survey shall be conducted prior to commencement of construction work. The second elevation survey shall be conducted at the completion of the construction work.

3.4.3 Methods

The locations of the survey points (DMPs) on the structures listed above shall be designated by the Government and a representative will accompany the General Contractor on the initial elevation survey. During the initial elevation survey, the General Contractor shall survey the locations (X and Y coordinates) of each of the survey points, as well as the elevations.
The X and Y coordinates shall be within 0.1-foot accuracy and the elevations shall be within 0.01-foot accuracy.

3.5 VIBRATION MONITORING

3.5.1 Structures to be Monitored

103 Elm Street, Elm Street Laundromat
103 Elm Street, Elm Street Self Car Wash

Elm Street Bridge

Crib Wall (located on the property of 50 Elm Street)

3.5.2 Scheduling of Vibration Monitoring Activities

Vibration monitoring shall be completed during any sheet piling or other heavy or intrusive construction activities completed within 200 feet of the structures listed above.

3.5.3 Security and Coordination with Property Owners

The monitoring device placed on the each of the structures listed above and shall be secured from theft and protected from the weather. The location of the monitoring device on each structure shall be approved by the appropriate parties of interest (owners, City of Pittsfield).

3.5.4 Collection and Downloading of Data

Data from the vibration monitoring devices shall be downloaded on a weekly basis. The monitoring devices shall have sufficient memory to record data on a continuous basis and sufficient battery life to operate for 10 days without battery replacement or recharging.

3.5.5 Action Levels

A maximum vibration limit of 0.5 inch per second peak particle velocity is suggested for sensitive structures where:

- The foundation type is unknown,
- The foundations are known to be wood piles but the condition is poor or unknown, or
- The foundations or foundation walls are in poor condition.

For structures with reinforced concrete foundation walls and steel or concrete foundations structurally connected to the walls, it is suggested that a maximum vibration limit of 1.0-inch per second for all other structures be used.

3.6 CONDITIONS MONITORING

3.6.1 Structures and Areas to be Monitored

The following structures and areas shall be included in the conditions monitoring survey:

- The east and west banks of the Housatonic River from the Lyman Street Bridge to the Elm Street Bridge.

- Building A: 10 Lyman Street
- Building B: 55 Root Place
- Building F: 103 Elm Street, Elm Street Laundromat
- Building G: 14 Hathaway Street, Residence and In-Ground Pool
- Lyman Street Bridge
- 53-59 Elm Street, Apartment Building and Garage
- 37 Elm Street, Harry's Supermarket and Billboards
- 103 Elm Street, Elm Street Self-Car Wash, including three vacuums at the top of bank
- 41 Root Place
- 48 Root Place
- 50 Root Place
- 50 Elm Street, including building and crib wall
- Elm Street Bridge
- Flow Deflection Structure for Culvert downstream of the Elm Street Bridge

3.6.2 Scheduling of Conditions Monitoring Surveys

Prior to commencement of construction work, and after completion of the construction work, the General Contractor shall be notified to conduct a conditions survey.

3.6.3 Methods

Prior to the performance of any construction work, the General Contractor shall discuss with the Government the property and structures to be surveyed by videotape (VHS Format) and the extent of the survey, but generally all structures within 100 feet of the work area will be completely surveyed as herein defined.

The Government will obtain permission from the property owners and provide contacts with which the General Contractor shall coordinate monitoring activities. Each property owner shall then be contacted by the General Contractor and informed as to the reason for the survey and an appointment requested with every reasonable effort made to accommodate the property owner schedule. If the General Contractor is refused entry, he will notify the Government and request direction.

The foundation of each structure shall be videotaped by the General Contractor with special attention to any cracking or structural defects in the foundations or walls of the structures, including but not limited to, binding doors and windows, cracked or broken glass, etc. The conditions of the riverbanks shall be videotaped from the water to the top of the bank, with special attention to areas of erosion, retaining walls, riprap, vegetation, and other features

requested by the Government. The video shall incorporate some type of notes, labels, or signs to clearly indicate the location or structure being videotaped. Rulers or gauges shall be placed next to cracks or structural defects to provide a semi-quantitative indication of size of these features. Videotaping of the riverbanks shall be conducted from a boat in the Housatonic River.

END OF SECTION

SECTION 01451

CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740	(1999b) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(1998a) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

U.S. ARMY CORPS OF ENGINEERS

CEGS 01451	(May 2000) Contractor Quality Control
CEGS 01330	(May 2000) Submittal Procedures

ROY F. WESTON, INC. (WESTON)

(September 2001) Contractor Quality Control Plan – General Electric/Housatonic River Project, Pittsfield, Massachusetts, DCN GE-090701-AAQY, Ref. No. 00-0528

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

CQC Plan Supplement; G

SD-10 Operation and Maintenance Data

Daily CQC Report

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product that complies with the contract requirements. The system shall cover all construction operations, both on-site and off-site, and shall be keyed to the proposed construction sequence. The CQC System Managers will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for noncompliance with the quality requirements specified in the contract. The site project superintendent shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent and CQC System Managers, or designated alternate, shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction-related activities at the site.

3.2 CONTRACTOR QUALITY CONTROL PLAN SUPPLEMENT

The General Contractor shall furnish for review by the Government, no later than 30 days after receipt of notice to proceed, a proposed Contractor Quality Control (CQC) Plan Supplement for Construction Work in the second phase of the 1.5-Mile Reach to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan addendum shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan Supplement or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan Supplement or another interim plan containing the additional features of work to be started**.**

3.2.1 Content of the CQC Plan Supplement

The CQC Plan Supplement shall be written to cover the construction activities specific to the second phase of the 1.5-Mile Reach, and shall include, as a minimum, the following to cover

all operations, both on-site and off-site, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three-phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project superintendent.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm that describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work that is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, off-site fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with described SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities will be approved by the Contracting Officer.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests, including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

3.2.2 Acceptance of Plan

Acceptance of the CQC Plan Supplement is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the General Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan Supplement, the General Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan Supplement, the General Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the General Contractor's quality control system. The CQC Plan Supplement shall be submitted for review a minimum of 5 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both on-site and off-site work, and the interrelationship of General Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the General Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures that may require corrective action by the General Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to assure safety and contract compliance. The Safety and Health Manager shall receive direction and authority from the CQC System Manager and shall serve as a member of the CQC staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The General Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to assure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. The General Contractor shall provide adequate office space, filing systems, and other resources as necessary to maintain an effective and fully functional CQC organization. Complete records of all letters, material submittals, shop drawing submittals, schedules, and all other project documentation shall be promptly furnished to the CQC organization by the General Contractor. The CQC organization shall be responsible for maintaining these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

The General Contractor shall identify as CQC System Manager an individual within the on-site work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the General Contractor. The minimum qualifications of the ERC CQC System Manager are listed below. The CQC System Manager and Alternate will either satisfy the following target qualifications or satisfy CENAE that his/her education and experience are appropriate to conduct the duties of CQC System Manager:

1. A college degree from an accredited school in civil engineering or construction management, with a minimum of 4 years of environmental engineering experience; or an experienced construction person with a minimum of 8 years of experience in related work.

2. Nine semester hours, 12 continuing education units (or a combination thereof) education in an area relevant to HTRW removal, and 2 years of experience in specialized areas, e.g., Remedial Investigation (RI), Remedial Design (RD), and Removal Action (RA).

3. Working knowledge of applicable federal, state, and local laws, regulations, and guidance.

4. Completion of CENAE Construction Quality Management Course.

5. Formal education and training in field sampling at HTRW sites.

The CQC System Manager has QC as a principal duty, but may be assigned other duties when the level of QC activity does not warrant full-time dedicated service, and the other assigned duties do not conflict with the QC Duties. The CQC System Manager, or Designated Alternate, is responsible for reviewing and approving all site submittals. He/she is responsible for overall QC management related to the TO.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, the General Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: electrical, mechanical, civil, structural, environmental, materials technician, submittals clerk. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; and have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan.

Experience Matrix

	Area	Qualifications
a.	Civil	Graduate Civil Engineer with 2 years of experience in the type of work being performed on this project or technician with 5 years of related experience
b.	Mechanical	Graduate Mechanical Engineer with 2 years of experience or person with 5 years of related experience
c.	Electrical	Graduate Electrical Engineer with 2 years of related experience or person with 5 years of related experience
d.	Structural	Graduate Structural Engineer with 2 years of experience or person with 5 years of related experience
e.	Environmental	Graduate Environmental Engineer with 3 years of experience
f.	Submittals	Submittal Clerk with 1 year of experience
g.	Concrete, Pavements, and Soils	Materials Technician with 2 years of experience for the appropriate area

3.4.4 Additional Requirement

In addition to the above experience and/or education requirements, the CQC System Manager shall have completed (within the last 5 years) the course entitled "Construction Quality Management For Contractors."

3.4.5 Organizational Changes

The General Contractor shall maintain the CQC staff at appropriate levels as approved by the Government. When it is necessary to make changes to the CQC staff, the General Contractor shall revise the CQC Plan Supplement to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, shall be made as specified in SUBMITTAL PROCEDURES and in Section 1 of the ERC Project CQCP. The CQC organization shall be responsible for certifying that all submittals and deliverables are in compliance with the contract requirements.

3.6 CONTROL

Contractor Quality Control is the means by which the General Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

a. A review of each paragraph of applicable specifications, reference codes, and standards. A copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field shall be made available by the General Contractor at the preparatory inspection. These copies shall be maintained in the field and available for use by Government personnel until final acceptance of the work.

b. A review of the contract drawings.

c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. A review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work, including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. A check to assure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. k. The Government shall be notified at least 48 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The General Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

a. A check of work to assure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to assure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government shall be notified at least 48 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work on-site, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work that may be affected by the deficient work. The General Contractor shall not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if: the quality of ongoing work is unacceptable; there are changes in the applicable CQC staff, on-site production supervision, or work crew; work on a definable feature is resumed after a substantial period of inactivity; or other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The General Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product that conforms to contract requirements. Upon request, the General Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The General Contractor shall procure the services of a Corps of Engineers-approved testing laboratory or establish an approved testing laboratory at the project site. The General Contractor shall perform the following activities and record and provide the following data:

- Verify that test facilities are available and comply with testing standards and certifications, as required (e.g., USACE Northwest Division [NWD] certified):
  - Confirm with the test facility that they are available to conduct subject tests; document the test facility's availability. Determine the testing standards from the plan or contract, and confirm that the laboratory can comply with the standards; document the laboratory's ability to comply.
- Verify that test equipment is available and complies with testing standards, if required:
  - If on-site or off-site testing is conducted, determine the testing equipment required from the test plan or contract; document that it is available. Determine that the test equipment can comply with test standards; document that the test equipment can comply.
- Check test instrument calibration data against certified standards.
  - Conduct and document an equipment calibration.
- Verify that appropriate recording forms are available:
  - Determine those parameters that must be recorded from the test plan or contract; assure that recording forms contain this information.
- Verify that a test identification control number system is prepared (e.g., test number assigned, sample numbers assigned, etc.):
  - Prepare a checklist based on the test plan or contract for required parameters such as test number and sample numbers (along with acronyms).
- Results of all tests taken, both passing and failing tests, shall be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be given. If

approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an off-site or commercial test facility shall be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 TEST RESULTS

A summary of tests completed each day will be documented on the Daily Contractor QC Report. Pertinent information will be provided for test results (e.g., location where tests were taken, sequential control number identifying the test, etc.)

The General Contractor will submit test results to CENAE. Due to the volume of results that may be generated, CENAE may exercise the option of requesting duplicate copies of only specific tests. During an initial meeting, the General Contractor and the Contracting Officer's Representative will agree on which tests will require duplicate copies, if any. Test results may also be posted on ProjectNet, as appropriate.

3.7.3 Testing Laboratories

3.7.3.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.3.2 Capability Recheck

If the selected laboratory fails the capability check, the General Contractor will be assessed a charge to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the General Contractor.

3.7.4 On-Site Laboratory

The Government reserves the right to utilize the General Contractor's control testing laboratory and equipment to make assurance tests, and to check the General Contractor's testing procedures, techniques, and test results.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the Special Clause, "Commencement, Prosecution, and Completion of Work," or by the specifications, the CQC Manager shall conduct an inspection of the work. A punch list of items that do not conform to the approved drawings and specifications shall be prepared and included in the CQC documentation, as required by paragraph documentation. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the General Contractor shall notify the Government that the work site is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the excavation and restoration is complete. A Government Pre-Final Punch List may be developed as a result of this inspection. The General Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The General Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance at the final acceptance inspection. Additional Government personnel may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the General Contractor's assurance that all specific items previously identified to the General Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the General Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the General Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction."

3.9 DOCUMENTATION

The General Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. General Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase shall be identified (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.

g. Off-site surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

j. General Contractor’s verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily by 2 p.m. after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no-work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. Reports will be provided on standard Daily Construction Quality Control Report (DCQCR) forms provided in Appendix L of the CQCP. Documentation of QC inspections will be provided in standardized format included in Appendix I of the CQCP.

Inspections, deficiencies, and corrective actions will be reported and tracked using forms provided in Appendices I (Inspection Check List), J (Deficiency and Corrective Action Log), and K (Deficiency Report Form). The report from the CQC System Manager shall also include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 SAMPLE FORMS

Sample forms are included in the final CQCP.

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the General Contractor of any detected noncompliance with the foregoing requirements. The General Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the General Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the General Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the General Contractor.

END OF SECTION

SECTION 01500

TEMPORARY CONSTRUCTION FACILITIES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The items described below will be considered incidental to the work conducted by the Excavation Subcontractor, and separate payment from the General Contractor will not be granted. Space will not be available at the existing project office at 10 Lyman Street for use by the Excavation Subcontractor. The Excavation Subcontractor shall provide temporary facilities as needed for his use during construction in accordance with the drawings and specifications.

1.1.1 Site Plan

The Excavation Subcontractor shall prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Excavation Subcontractor, the number of trailers to be used, avenues of ingress/egress to the fenced area, and details of the fence installation. Any areas that may require placement of gravel to prevent the tracking of mud shall also be identified. The General Contractor shall also indicate if the use of a supplemental or other staging area is desired.

1.1.2 Identification of Employees

Excavation Subcontractor and other subcontractor personnel shall wear identifying markings on hard hats clearly identifying the company for whom the employee works.

1.1.3 Employee Parking

General Contractor and Subcontractor employees shall park privately owned vehicles in an area designated by the Contracting Officer and as indicated on the drawings. This area will be at the Lyman Street parking lot, which is within reasonable walking distance of the construction site. General Contractor and Subcontractor employee parking shall not interfere with existing and established parking requirements of the municipality.

1.2 AVAILABILITY AND USE OF UTILITY SERVICES

The following subsections describe requirements for the Excavation Subcontractor's temporary construction facilities.

1.2.1 Payment for Utility Services

The Excavation Subcontractor and its subcontractors shall make all necessary applications and arrangements and pay all fees and charges for utilities necessary for the proper completion of the Work during its entire progress, except when the specifications particularly state that the Government shall pay for the utility used in making tests. The Excavation Subcontractor and its subcontractors shall provide and pay for all temporary wiring, switches, connections, and meters as appropriate.

1.2.2 Meters and Temporary Connections

The Excavation Subcontractor shall provide and maintain necessary temporary connections, distribution lines, and meters (subject to approval of the General Contractor and applicable utility) required to measure the amount of each utility used for the purpose of determining charges.

1.2.3 Final Meter Reading

Before completion of the work and final acceptance of the work by the General Contractor, the Excavation Subcontractor shall arrange for termination of utility services. Upon termination, the Excavation Subcontractor shall then remove all the temporary distribution lines, meters, and associated paraphernalia. The Excavation Subcontractor shall pay all outstanding utility bills before final acceptance of the work by the General Contractor and the Government.

1.2.4 Sanitation

The Excavation Subcontractor shall provide adequate sanitary conveniences for the use of those employed on the Work site. Such conveniences shall be made available when the first employees arrive on the Work site, shall be properly secluded from public observation, and shall be constructed and maintained in suitable number and at such points and in such manner as may be required or approved. The Excavation Subcontractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. The Excavation Subcontractor shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Government, or on adjacent property.

1.2.5 Telephone

The Excavation Subcontractor shall make arrangements and pay all costs for telephone facilities desired.

1.3 BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.3.1 1.3.1 Bulletin Board

Immediately upon beginning of the Work, the General Contractor shall provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. The bulletin board shall be located at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Legible copies of the aforementioned data shall be displayed until work is completed. Upon completion of work the bulletin board shall be removed by and remain the property of the General Contractor.

1.3.2 Project and Safety Signs

The requirements for the signs, their content, and location shall be as shown on the drawings. The signs shall be erected within 15 days after receipt of the notice to proceed. The data required by the safety sign shall be corrected daily, with light-colored metallic or non-metallic numerals. Upon completion of the project, the signs shall be removed from the site.

1.4 PROTECTION AND MAINTENANCE OF TRAFFIC

During construction the General Contractor shall provide access and temporary relocated roads as necessary to maintain traffic. The General Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the State and local authorities having jurisdiction. The traveling public shall be protected from damage to person and property. The General Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The General Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. The General Contractor shall be responsible for the repair of any damage to roads caused by construction operations.

1.4.1 Haul Roads

The Excavation Subcontractor shall construct access and haul roads necessary for proper prosecution of the work under this contract outside of the river channel. The Excavation Subcontractor also shall be responsible for construction of access ways and haul roads within the river channel to connect to the out-of-river haul roads. Measures shall be taken to minimize the amount of material used to construct all haul roads but especially haul roads constructed inside the river channel. Haul roads shall be constructed with suitable grades and

widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Excavation Subcontractor shall provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to assure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the General Contractor. Lighting shall be adequate to ensure full and clear visibility for full width of haul road and work areas during any night work operations. Upon completion of the work, haul roads designated by the General Contractor shall be removed and the property restored to an equal or better condition. Haul roads constructed inside the river channel shall be removed and disposed of at the OPCAs, as necessary.

1.4.2 Barricades

The Excavation Subcontractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking areas, or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed and be clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.5 EXCAVATION SUBCONTRACTOR'S TEMPORARY FACILITIES

1.5.1 Administrative Field Offices

The Excavation Subcontractor shall provide and maintain administrative field office facilities based on his determined needs during construction activities.

1.5.2 Storage Area

The Excavation Subcontractor will construct a temporary 6-foot-high chain-link fence around the entire work zone. In addition, the Lyman Street parking lot, which is fenced, is available for placement of trailers, materials, and equipment. Trailers, materials, or equipment shall not be placed or stored outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the General Contractor. Trailers, equipment, or materials shall not be open to public view with the exception of those items that are in support of ongoing work on any given day.

1.5.3 Supplemental Storage Area

Upon Excavation Subcontractor's request, the General Contractor will designate another or supplemental area for the Excavation Subcontractor's use and storage of trailers, equipment, and materials. Fencing of materials or equipment will not be required at this site; however,

the Excavation Subcontractor shall be responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area.

1.5.4 Appearance of Trailers

Trailers utilized by the Excavation Subcontractor for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers that, in the opinion of the General Contractor, require exterior painting or maintenance will not be allowed on the project site.

1.5.5 Maintenance of Storage Area

Fencing shall be kept in a state of good repair and proper alignment. Should the Excavation Subcontractor elect to traverse, with construction equipment or other vehicles, grassed or unpaved areas that are not established roadways, such areas shall be covered with an appropriate geotextile and a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation shall be at the Excavation Subcontractor's discretion. Grass located within the boundaries of the construction site shall be mowed for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers shall be edged or trimmed neatly.

1.5.6 Security Provisions

Adequate outside security lighting shall be provided at the General Contractor's temporary facilities. The General Contractor and its Subcontractors shall be responsible for the security of their respective equipment; in addition, the General Contractor shall notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

1.6 GOVERNMENT FIELD OFFICE (NOT SUPPLIED UNDER THIS CONTRACT)

1.7 CLEANUP

Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud that is tracked onto paved or surfaced roadways shall be cleaned away immediately. Materials resulting from demolition activities that are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

1.8 RESTORATION OF STORAGE AREA

Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, any fence installed by the Excavation Subcontractor shall be removed

and will become the property of the Excavation Subcontractor. Areas used by the Excavation Subcontractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including topsoil and seeding as necessary.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01562

DUST CONTROL

PART 1 GENERAL

a. Furnish all labor, material, tools, and equipment to apply water on roads, traveled surfaces, excavation areas, stockpile areas, and other work areas within the construction site when directed by the Government and/or as necessary to control dust.

b. When dust control is not included as a separate item in the Contract, the Work shall be considered incidental to the appropriate items of the Contract.

PART 2 PRODUCTS

2.1 WATER

a. Water for sprinkling shall be clean, free of salt, oil, and other injurious materials.

PART 3 EXECUTION

3.1 WATER APPLICATION

a. Water shall be applied by equipment approved by the Government. As a minimum, it shall consist of a tank, a spray bar, and a gauge equipped pump. Water shall be dispersed through nozzles at a minimum pressure of 20 psi.

b. The site area shall be monitored by the General Contractor for visible dust. Based upon this monitoring, the Excavation Subcontractor shall implement dust control measures as necessary to minimize generation and migration of dust.

END OF SECTION

DIVISION 2—SITE WORK

SECTION 02111

HANDLING OF EXCAVATED MATERIAL AND BACKFILL

PART 1 GENERAL

Excavated material shall be handled so as to avoid mixing of TSCA (material regulated under the Toxic Substances Control Act) and non-TSCA (material not regulated under the Toxic Substances Control Act) soils and avoid mixing either with uncontaminated backfill or other materials. Handling excavated material shall include haulage and placement in stockpiles at appropriate locations. Handling also includes removal of stockpiled soils that meet specified criteria, and haulage to end dump at the GE landfills (referred to as the OPCAs). All haulage, both from the excavation to stockpiles, and from the stockpiles to the OPCAs, shall be conducted by the Excavation Subcontractor. In addition, the Excavation Subcontractor shall maintain stockpiled soils at the staging area as specified and load the stockpiled soils into trucks provided by the Excavation Subcontractor for haulage to the OPCAs. Spreading and compacting at the landfill will be accomplished by GE and is not included in this contract. Material scheduled for off-site disposal shall be arranged by the General Contractor as necessary.

Furnish all labor, materials, tools and equipment, and perform all operations necessary for sampling, field testing, laboratory analysis (of backfill materials), and handling of excavated sediment and soil removed from the riverbed and riverbanks and backfill materials to be delivered to the site as specified or as directed by the Government. Excavation of contaminated materials, placement of those materials in trucks, and supply, testing, and placement and in situ physical testing of backfill material will be performed by the Excavation Subcontractor.

Furnish all labor, material, tools, and equipment to construct or accomplish the following:

1. Operation and maintenance of the contaminated materials staging area located in the vicinity of and within Buildings 63, 65, and 68, and potentially on the Lyman Street parking lot on the GE property for the purposes of dewatering and characterizing contaminated materials prior to disposal at the OPCAs. This also includes handling of debris in accordance with this specification.

2. Operate and maintain truck wash pads located one on each side of the river near the active excavation to eliminate the deposition of construction related materials from the trucks onto roadways while on route to the contaminated materials staging areas. Operate and maintain decontamination wash pads at each of the contaminated materials staging areas for purposes of decontaminating trucks hauling contaminated materials (soils, sediments, stumps, and other construction and incidental debris) from the contaminated materials staging area. Trucks shall be decontaminated or washed to the satisfaction of the QC Manager before leaving the exclusion zones established along the perimeter of the contaminated materials staging area or the excavation areas.

3. Manage and control surface water run-on and runoff occurring at the staging area such that the amount of rainwater that becomes contaminated through contact with contaminated sediments and soils is minimized.

4. Contain contaminated wastewater resulting from the dewatering of soils and sediments and the decontamination of trucks and equipment. Transport contaminated wastewater to the water treatment system as frequently as is necessary.

Backfill materials shall be delivered to the site, stored, and handled in such a way as to minimize the potential for contact with contaminated materials on the site. In general, backfill materials shall be brought to the site as needed to minimize the amount stored on-site; however, it is recognized that storage of some backfill material will be necessary. Locations available for storage of backfill will be coordinated between the General Contractor and the Excavation Subcontractor.

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Pre-Construction Submittals

Excavation Plan

Proposed procedures addressing the handling of materials excavated from the riverbed and riverbanks that have high moisture contents, including locations for interim storage, and any other procedures that shall be utilized to eliminate the distribution of water from saturated sediments within the active excavation and adjacent areas of excavation and the possible contamination of support areas and haul roads. Excavation plan should include location of decon pad and plan. No equipment that enters the riverbed will be allowed to exit the site without thorough decontamination. The sediment subgrade in the riverbed, following excavation to required grade, shall be presumed to be contaminated.

SD-06 Test Reports

Analytical Test Reports for all backfill materials; G

Analytical Test Reports for paint filter testing of excavated sediment and soil; G

Geotechnical Test Reports for backfill materials; G

Wipe Sampling Data; G

1.2 REGULATORY REQUIREMENTS

As a CERCLA removal action, permits for hauling and storage of contaminated material are not required for on-site work. All on-site work performed shall conform to the regulations specified in the attached project ARARs table. For the on-site transportation of contaminated materials, all substantive requirements, such as the use of tarps and placarding, shall be followed. Administrative requirements, including, but not limited to manifesting and the use of trucks and drivers licensed to transport hazardous waste need not be fulfilled. Haul roads, including those constructed during Phase 1 of the 1.5-Mile Removal Action along private property (properties adjacent to the 1.5 Mile Reach) and the perpendicular crossing at Lyman Street into GE's Lyman Street parking lot, as well as perpendicular crossings of East Street, Tyler Street, and New York Avenue, are considered to be "on-site" for purposes of this evaluation. Manifesting may be required for vehicles transporting contaminated material on public roads.

1.3 DESCRIPTION OF WORK

The work conducted by the General Contractor shall consist of chemical sampling of backfill and contaminated material. Chemical analysis of contaminated soil material performed by the Government is the basis for the limits of excavation and areas of TSCA- and non-TSCA-classified soils and sediments shown on the Drawings. Additional chemical characterization of excavated materials will not be required for disposal purposes. Sampling of materials for free liquids (paint filter test) by the General Contractor will be necessary before disposal in the OPCAs.

Work conducted by the Excavation Subcontractor shall consist of decontaminating trucks, temporarily storing contaminated materials, providing testing (geotechnical only), delivering, storing, and placing of backfill, hauling contaminated materials from the active excavation, and hauling contaminated materials to the GE OPCAs for final disposal. Trucks hauling contaminated materials from either the active excavation or the contaminated soil and sediment staging area shall be off-road trucks or road-worthy trucks with polyethylene liners or watertight seals to eliminate the release of liquids from saturated soils and/or sediments.

The primary purpose of the contaminated materials staging area and decontamination pad is to provide an area which isolates contaminated materials within an exclusion zone while the material is being gravity dewatered, characterized, and/or accumulated for disposal. During Phase 1/Phase 2 Transition of the 1.5-Mile Removal Action, all materials except those indicated for off-site disposal in other specification sections shall be transported to and disposed of at the OPCAs.

Trucks entering the soil and sediment staging area to either deposit contaminated materials or receive contaminated materials shall be decontaminated prior to leaving the exclusion zone at the decontamination pad. Decontamination of trucks at the GE OPCAs following delivery of contaminated materials at these facilities is not included in this contract.

1.4 CONTAMINATED MATERIALS TESTING

Testing of contaminated materials for free liquids using the paint filter test shall be performed at the staging area by the General Contractor. No characterization sampling of excavated materials is required, unless materials are sent for off-site disposal (e.g., NAPL-impacted materials, spent carbon).

1.5 BACKFILL MATERIALS TESTING

Backfill materials shall be tested for geotechnical and chemical parameters and approved before being brought on-site.

PART 2 PRODUCTS

2.1 SEDIMENT BARRIERS

a. Sediment barriers shall be hay or straw bales, geotextile fabric, stone, or other approved materials that will prevent the release of sediment from the exclusion zone.

b. Sediment barriers shall be used to minimize the amount of sediment that is contained in wastewater to be collected and stored on-site in storage tanks prior to transport to the wastewater treatment system.

2.2 WATER STORAGE TANKS

Tanks of sufficient size shall be used to store water generated and collected from decontamination operations and soil and sediment gravity dewatering prior to transport to the treatment plant.

2.3 TARPS AND POLYETHYLENE SHEETING

In general, heavy-duty tarps shall be used to cover contaminated materials stockpiles to prevent the generation of excess contaminated run-on and the infiltration of precipitation into contaminated materials. However, for stockpile areas located within buildings, tarp covers shall not be necessary.

2.4 POLYETHYLENE LINER MATERIAL

Polyethylene liners shall be used to line the areas for stockpiling contaminated materials. HDPE liner material shall be used for outdoor stockpiles and shall be a minimum of 40-mil thickness. For indoor contaminated material stockpiles, a minimum 6-mil thickness

polyethylene liner shall be used. Use of thinner gauge HDPE liner for lining of stockpile areas outdoors or other uses shall only be allowed upon approval by the Government.

2.5 MUNICIPAL WATER CONNECTION

Connections shall be made to the municipal water supply where necessary (near the active excavation area and at the contaminated materials staging area located on GE property) using temporary flexible hoses, backflow preventers, and meters in accordance with City of Pittsfield requirements and GE requirements as appropriate. During freezing conditions, care shall be taken to prevent freezing up of hoses, fittings, meters, etc., and development of unsafe icy conditions. Use of river water for deconning, watering, and dust suppression is permitted.

2.6 SPILL RESPONSE MATERIALS

The General Contractor shall provide spill response materials including, but not limited to the following: containers, adsorbents, shovels, and personal protective equipment. Spill response materials shall be available at all times when hazardous materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of materials and contaminants being handled.

PART 3 EXECUTION

3.1 EXISTING STRUCTURES AND UTILITIES

The Excavation Subcontractor shall take the necessary precautions to ensure no damage occurs to existing structures and utilities. Utilities encountered that were not previously shown or otherwise located shall not be disturbed without written approval from the General Contractor.

3.2 LOADING AND HAULING OF CONTAMINATED MATERIAL

The Excavation Subcontractor shall take precautionary measures as necessary while loading to minimize the steps needed to decontaminate hauling vehicles at the active excavation-site and at the contaminated materials staging area when loading for transport to the OPCAs. Trucks hauling contaminated materials from either the active excavation area or the stockpile/staging area shall be loaded in such a way as to prevent contamination of vehicles' tires, tailgates, and the outside of the vehicle.

The Excavation Subcontractor shall provide hauling trucks at the site of active excavation. The Excavation Subcontractor shall provide procedures for handling saturated materials excavated from the riverbed or riverbank. Materials considered to have excessive moisture content (i.e., such that leakage of free liquids from trucks would be a concern) shall be

handled in such a manner to eliminate the possibility of contamination of areas outside the limit of excavation, including haul roads to the contaminated materials staging areas. Materials with excessive moisture content shall be allowed to dewater until an acceptable moisture content is reached as approved by the General Contractor. Saturated materials that have been dewatered to an acceptable moisture content for transport shall be moved to the appropriate contaminated materials staging area as soon as possible.

Hauling of materials from the contaminated materials stockpile to the GE OPCA by the Excavation Subcontractor will be limited to the days on which GE is operating the landfill and therefore shall be performed as batch operations. Therefore, the Excavation Subcontractor shall appropriately size staging areas to allow the continued accumulation of materials during the periods when GE is not operating the landfill. In addition, materials shall not be hauled to the OPCA until they have been determined to be devoid of free liquids (via paint filter test). All bank soils shall be sampled for free liquids after removal, and all sediments shall be tested for free liquids after removal and gravity draining of free liquids. Soils and sediments shall be tested using EPA Method 9095A (paint filter test) as appropriate or by an equivalent method approved by the Engineer. The time required to dewater materials to an acceptable moisture content shall also be considered when sizing the staging areas. The Excavation Subcontractor shall ensure the delivery of 30 truckloads of material to the OPCA each day the OPCA is open for additional consolidation (excluding the final day of hauling).

3.3 SOIL AND SEDIMENT SEGREGATION

Immediately following excavation and loading (which will be performed by the Excavation Subcontractor), soil and sediment shall be carefully placed in trucks, hauled along the temporary access roads, and stockpiled in the staging area located on the GE property near and within Buildings 63, 65, and 68. However, for saturated soils and sediments, an interim dewatering measure shall be implemented to allow for transport to the contaminated materials stockpile areas on GE Property as described in Section 3.2.

Segregation of soils/sediments will focus on two major criteria or characteristics–total PCB concentrations and NAPL as described below.

a. PCBs—PCB concentrations for bank soils and sediments to be excavated and removed have been pre-determined through in-place testing. Based on these data, soil and sediment have been pre-classified as either TSCA- or non-TSCA-regulated as indicated on the Drawings and must be kept separate based on these classifications. TSCA-regulated soils and sediments shall ultimately be consolidated in the Building 71 Cell GE OPCA, and all non-TSCA soils and sediments shall be consolidated in the Hill 78 Cell GE OPCA.

b. NAPL—NAPL-impacted soil and sediment will be stockpiled separately, pending characterization and off-site disposal.

3.4 SAMPLING

The General Contractor shall perform free liquids testing of excavated material on a frequency of one test per 100 cy of material to determine whether material is suitable for transport to the OPCAs. The paint filter test results and whether the material meets the acceptability criteria shall be recorded in a written log. If the material does not meet the acceptability criteria, additional time for gravity dewatering and air drying shall be provided to reach an acceptable moisture content. Based on activities performed by GE at the ½-Mile Removal Action, dewatering activities other than gravity dewatering and air drying will not be required. The sample log shall be reviewed at least once per week by the CQC Systems Manager or representative.

In situ confirmation sampling and sampling from stockpiles is not required for excavated materials to be disposed of at the GE OPCA.

Geotechnical testing of backfill materials shall be performed by the Excavation Subcontractor and chemical testing will be conducted by the General Contractor. Approval of those materials by the Government must be received before the material is delivered to the site. Backfill materials must meet the requirements as specified in Section 02300 – EARTHWORK. At least one sample shall be collected for each material proposed for use. If more than one source is identified for a particular material, at least one sample from each source must be collected. Chemical and geotechnical analysis requirements and methods are described below.

a. Chemical Testing

Samples for chemical analysis shall be collected at the following approximate frequencies (based on the as-measured in-place volume of backfill materials upon completion of restoration):

PCBs samples:	1 sample per 500 cy of material
VOCs, SVOCs, Metals:	1 sample per 2,000 cy of material
TPH:	1 sample per 500 cy of material

The number of samples to be collected from each source for a particular backfill material shall be estimated based on these frequencies and available information at the time of sampling. Samples must be analyzed for the parameters above using the approved methods included in the Project QAPP for PCBs and Appendix IX compounds, and for TPH using SW-846 Method 8100 (GC/FID). Backfill materials must not contain chemical concentrations equal to or greater than 0.1 mg/kg for total PCBs and 200 mg/kg for TPH. Backfill material standards for the Appendix IX compounds will be determined prior to construction. In general, MCP S-1 Standards will be used for Appendix IX compounds.

Laboratory test reports for the backfill material must be submitted to and approved by the Government before material can be brought on-site.

b. Geotechnical Testing

Geotechnical testing will be conducted on backfill materials based on the methods and frequencies included in the attached Table 02111-1. Geotechnical test reports for the backfill material must be submitted to and approved by the government before material can be brought on-site.

3.5 SEGREGATION, STOCKPILING, AND DISPOSAL OF OTHER MATERIALS

Debris, including boulders, stumps, metal, concrete, etc., will be segregated by the Excavation Subcontractor and placed in separate trucks to maintain segregation for purposes of disposal or payment. All material excavated shall be characterized by the area from which it was excavated. Therefore, stumps and concrete, and other debris excavated from sediments and soils delineated as TSCA shall be classified as TSCA, and all materials excavated from sediments and soils delineated as non-TSCA shall be classified as non-TSCA and disposed of accordingly. The Excavation Subcontractor shall provide an appropriate number of trucks to handle separately various types of waste (soil, sediment, stumps, concrete, boulders, or other debris) generated as excavation progresses. Segregation of these materials shall be maintained at the staging area to allow for appropriate disposal practices at the OPCAs in accordance with the Consent Decree.

3.6 DECONTAMINATION AND TRUCK WASH PADS

A decontamination pad has been constructed at the contaminated materials staging area for Phase 1. Additional decontamination pads shall be constructed at each contaminated materials staging area when in use. Truck wash pads shall be operated as necessary near the active excavation area. Each of the truck wash pads shall be constructed in such a manner as to be easily removed and disposed of. Both the truck wash pads and the staging area decontamination pad shall be used to prevent the release of contamination beyond the limits of the exclusion zones through transport on heavy vehicles, including dump trucks, heavy equipment, and other vehicles that enter the exclusion zones.

3.6.1 Contaminated Materials Staging Area Decontamination Pad

a. The staging area decontamination pad has been constructed to allow sufficient room for truck decontamination as described in this section. The pad is constructed to collect accumulated decontamination water in a central collection sump for subsequent removal.

b. Before entering the decontamination pad, equipment requiring decontamination shall be decontaminated using dry decontamination methods to remove gross material adhering to the surfaces of the equipment (e.g., treads, tracks, tail gates) to prevent excessive buildup of contaminated materials in the decontamination pad. Dry decontamination methods

may include the use of such equipment as brooms, brushes, shovels, or other appropriate means as necessary to remove a majority of materials before entering the decontamination pad.

c. Following dry decontamination methods, equipment shall be decontaminated on the decontamination pad using a high pressure water or water/steam spray to remove remaining material adhering to equipment surfaces. Areas of particular concern include truck tires, treads, and tailgates. Vehicles being decontaminated shall be inspected before leaving the pad such that the condition of the vehicle is considered acceptable to the QC Manager or QC Manager's Representative and the potential for the spread of contamination beyond the exclusion zone is minimized.

d. Accumulating solid materials shall be removed from the decontamination pad as frequently as is necessary to prevent the recontamination of vehicle treads before leaving the decontamination pad and to encourage free flow of wash water to a central collection point.

e. The central collection point for the decontamination pad shall be cleaned on a regular basis to prevent excessive buildup of sediments that could interfere with normal wash water flow or reduce the storage capacity at that point.

f. With the exception of the truck wash pads, water generated from the decontamination area shall be pumped into a storage tank as frequently as is necessary to prevent the release of water from the decontamination pad system.

g. Wipe sampling of heavy equipment and sheet piles will be required at the end of the work following final cleaning, and prior to sending equipment off the site. Wipe sampling will be conducted by the General Contractor on equipment to document PCB levels below 10 $\mu g/100\ cm^2$, in accordance with 40 CFR 761.79.

3.6.2 Truck Wash Pads

At the Truck Wash Pads, truck tires shall be washed using a pressure washer to remove materials (e.g., material from uncontaminated access roads) adhering to tire treads and sidewalls. Therefore, the wash water will not be collected. These pads shall be temporary pads that can easily be moved as necessary.

3.7 SOIL AND SEDIMENT STAGING AREA

The area in the vicinity of Buildings 63, 65, and 68 on GE property, and the Lyman Street parking lot, is available for staging of soil and sediment. The areas shall be operated and maintained in such a manner by the Excavation Subcontractor as to accomplish the following:

a. The grades of the area shall be such that surface run-off will be directed towards specific areas so that sediment barriers can be used to minimize the amount of sedimentation

which leaves the exclusion zone with exiting run-off. Although precautions shall be taken to prevent the buildup of materials on the working surfaces of the staging area where heavy equipment must operate, this area will require cleaning using heavy equipment (e.g., loader bucket or street sweeper) on a frequent basis, especially immediately prior to anticipated storm events to minimize this potential.

b. Sediments accumulated at the sediment barrier shall be removed on a regular basis so that normal surface flow from the area is not impeded.

3.8 SOIL AND SEDIMENT STORAGE

a. In general, water-releasing materials such as sediments shall be kept in a separate area from non-water releasing materials such as soils, and non-TSCA materials shall be kept segregated from TSCA materials. The segregation of saturated material from non-water releasing material shall be addressed in the Excavation Plan to be submitted by the Excavation Subcontractor as discussed above.

b. Sumps or other appropriate structures shall be located at the corners or other strategic locations of the staging area to allow the efficient pumping of contaminated runoff to a storage tank. Water accumulating in the sumps shall be pumped to storage tanks as frequently as necessary to prevent overflow beyond the exclusion zone and to maintain the normal gravity flow of water from the contaminated materials piles. Sediment accumulating in the sumps or other low points shall be removed as necessary to maintain normal flow of water. In addition, any standing water that accumulates on the working surface of the staging areas not captured by sumps shall be vacuumed on a daily basis and consolidated into storage tanks.

c. Soil and sediment piles located outside shall be covered using heavy-duty tarps or other acceptable material as necessary to minimize the potential for rainwater infiltration. Covers shall be placed so that the amount of uncontaminated rainwater flowing off the covers and coming in contact with contaminated soils or sediments is minimized. Covers shall not be required for materials stored inside buildings.

d. Soil piles shall be shaped to encourage the proper flow of rainwater off of the covers without excessive contact with contaminated materials. Uncontaminated runoff from the covers shall be directed beyond the exclusion zone.

3.9 DEBRIS AREA

Areas shall be maintained for the accumulation of debris (including stumps, concrete larger than 1 cubic yard and boulders larger than 2 feet) removed from the excavation area. This area shall be located within a specified area on GE property. The debris shall be considered contaminated, and as such, the debris storage area shall be underlain by polyethylene and surrounded with haybales to prevent the migration of contaminated sediments from this area. The debris shall be covered with heavy-duty tarps to minimize contaminated materials migration from the debris. Disposal and size reduction of stumps shall be in accordance with

Section 02230, CLEARING AND GRUBBING AND SITE PREPARATION to allow for disposal at the OPCAs. Concrete shall be crushed to a maximum size of 4 feet in any dimension before transport to the OPCA. Segregated boulders shall be disposed of in the OPCA or washed and used as part of site restoration. All metallic debris excavated shall be consolidated in the OPCA. Boulders generated as a result of excavation could potentially be cleaned and re-used, pending the results of a planned boulder/cobble washing pilot test.

3.10 BACKILL MATERIAL STORAGE

Backfill materials shall be stored on-site in Government-approved areas. The areas shown for storage of backfill materials shall be prepared so that uncontaminated backfill materials do not come into contact with the existing ground surface, which is considered contaminated. In addition, preparation of the areas for storage of backfill materials shall not involve any intrusive disturbance of the existing ground surface.

3.11 WASTEWATER MANAGEMENT

a. Contaminated wastewater requiring transport to the temporary wastewater treatment system will be generated at several locations within the soil and sediment staging area and the decontamination pad. Activities or events which will generate contaminated wastewater include steam/high pressure washing at the decontamination pad, gravity dewatering of sediments, and rainwater infiltration through soil and sediment piles.

b. At the Excavation Subcontractor's option, water generated from these activities can be managed in separate storage tanks or within a larger central storage tank to facilitate transfer to the wastewater treatment facility. Wastewater generated from the contaminated materials staging area operations shall be transported via truck to the wastewater treatment system.

3.12 SPILLS

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), pollutant, contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), the Excavation Subcontractor shall notify the General Contractor immediately. The General Contractor shall report any spill or release immediately to the Government. Immediate containment actions shall be taken to minimize the effect of any spill or leak. Cleanup shall be in accordance with applicable federal, state, and local regulations and shall be conducted in consultation with the General Contractor.

END OF SECTION

SECTION 02230

CLEARING AND GRUBBING AND SITE PREPARATION

PART 1 GENERAL

1.1 DESCRIPTION

The subsections below provide a detailed description of the clearing, grubbing, and site preparation activities covered under this section. In general, this section covers work to be conducted by the Excavation Subcontractor, including all clearing on the site, and grubbing outside the river channel for access roads, staging areas, etc. Grubbing of stumps within the river channel will be conducted as part of the excavation work by the Excavation Subcontractor. Site preparation activities shall include the construction of haul roads and the necessary provisions for the placement of materials and equipment associated with construction activities.

1.1.1 Clearing

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring in the areas to be cleared, which include areas within and outside of the limits of excavation.

All trees shall be cut using equipment to meet the following requirements, and will be staged on plastic liner. The trees shall not be allowed to fall into the river or on the ground. They are to be cut, carried, and placed on polyethylene sheeting or heavy-duty tarps before they are chipped.

1.1.2 Disposal, Chipping, and Hauling

Material cleared from within contaminated areas will not be allowed for resale or reuse off-site. This material will be used on-site or disposed of off-site at a wood-burning generating facility or other approved off-site disposal facility.

All material cleared from areas outside the contamination zone that do not come into contact with soil within contaminated areas will be available for sale by the Excavation Subcontractor. If possible, this material will be sold to an approved off-site buyer as usable timber to reduce the cost of the clearing effort.

All trees and brush cleared from areas outside the contamination zone that cannot be sold shall be chipped into box trailers for disposal at a wood-burning generating facility or other approved off-site disposal facility. In addition, chips from this material can be used on-site as mulch upon approval by the Government.

1.1.3 Grubbing

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from designated grubbing areas, such as access roads, support areas, and staging areas, as necessary. Surplus soil adhering to the surfaces of removed stumps and roots shall be removed using an appropriate method (e.g., shaking). The areas to be grubbed shall be identified in the field at the time of construction. This section does not include removal of stumps within the excavation limits, which will be removed by the Excavation Subcontractor at the time of excavation.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Materials Proposed for Off-Site Disposal; G

Site Preparation Plan; G

Written permission to dispose of waste materials at off-site facilities shall be filed with the Contracting Officer. Provide the name, address, and contact person proposed for off-site disposal facilities.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 CLEARING AND GRUBBING

3.1.1 Clearing

Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off to the following heights—within the limits of excavation, 6 inches or less above the original ground surface and outside of the limits of excavation, as close to the original ground surface as possible without causing contamination of cut wood or equipment. Clearing shall be minimized to areas necessary for the progression of construction activities. Cut trees and

branches shall not be permitted to come into contact with contaminated soils or sediments. The Excavation Subcontractor shall use appropriate measures to prevent such contact.

The General Contractor shall clearly flag or mark trees to be left standing for approval by the Government. The Excavation Subcontractor shall clear only those trees not marked or flagged in areas necessary for work to progress. Trees designated to be left standing within the cleared areas shall be trimmed of branches as required. Trees and vegetation to be left standing shall be protected from damage incidental to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work.

The Excavation Subcontractor shall take all precautions necessary to protect existing trees scheduled to remain such that they will be free from any damage or injury, including cutting, breaking, or skinning of roots, trunks or branches or smothering by stockpiled construction materials, excavated materials, or vehicular traffic within branch spread. Interfering branches of trees scheduled to remain may be removed when acceptable to the General Contractor. Trees scheduled to remain that are damaged due to construction operations shall be repaired by the Excavation Subcontractor in a manner acceptable to the General Contractor.

Should an existing tree be damaged to the extent that it is deemed to be a complete loss by the General Contractor, or if, due to the negligence of the Excavation Subcontractor, a tree on the construction site dies within 1 year of project completion, the Excavation Subcontractor shall replace the tree according to the following requirements:

- Tree Replacement Formula—One square inch of caliper lost will equal 1 square inch of caliper replaced. This formula is based on tree trunk diameter at breast height.

- The Excavation Subcontractor will be responsible for planting the replacement tree(s) at a location designated by the General Contractor. The replacement tree(s) shall be of the same species and variety as the tree(s) lost. If the species and variety is not available, a substitute must be proposed by the Excavation Subcontractor and approved by the General Contractor. The minimum caliper of replacement tree(s) shall be 2.5 to 3 inches.

3.1.2 Grubbing

Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground or proposed finish grade, whichever is lower, in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground. Disturbance to the ground surface outside of the limits of excavation must be minimized to comply with project objectives and TSCA.

3.2 DISPOSAL OF MATERIALS

3.2.1 Selling of Material

All trees and brush cleared from areas outside contaminated areas that have not come in contact with the ground surface of contaminated areas or the river and considered to be usable timber shall be available for sale to an approved off-site buyer. The Government shall approve the buyer for the sale of usable timber. All material cleared from within contaminated areas shall not be available for resale or reuse.

3.2.2 Chippable Material

Trees and brush cleared from areas outside contaminated areas that could not be sold and that have not come in contact with the ground surface of contaminated areas or the river shall be chipped into box trailers and hauled for disposal at an approved off-site disposal facility. Chips may be used as mulch on-site as part of site restoration activities. In addition, chips from material cleared outside contaminated areas shall be available for use as mulch at off-site locations. Material cleared from within contaminated areas shall be available for chipping to be used on site for site preparations purposes.

3.2.3 Materials Other Than Chippable Material

Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations that have come into contact with the ground surface shall be stockpiled in the designated stump stockpile areas and disposed of at the GE OPCA. These materials shall be sliced or chipped to a maximum 6-inch size and subsequently transported to an OPCA specified by GE for disposal. Alternatively, this material could be sent off-site for disposal. Concrete debris generated during these activities shall be stockpiled for later crushing along with other concrete debris to be generated by bank excavation activities.

3.3 SITE PREPARATION

Site preparation shall include the construction of haul roads and staging areas for storing and transferring materials and equipment. A Site Preparation Plan shall be submitted by the Excavation Subcontractor detailing the implementation of installation, materials to be used for the construction, and the locations of staging areas and equipment, including office trailers and designated equipment storage locations, and access roads. The Excavation Subcontractor shall minimize the amount of material used to construct the haul roads and staging areas. At a minimum, all haul roads, support areas, and staging areas shall be lined with a geotextile fabric prior to the placement of any material on the existing ground surface to minimize the contact between any construction related equipment and the existing ground surface and to allow for the removal of this material at project completion as necessary.

3.3.1 Haul Roads

Haul roads shall be constructed by the Excavation Subcontractor to allow for the efficient transfer of construction-related equipment, excavated materials, and backfill material. Access roads shall have a minimum width to allow for the safe passage of all construction equipment to and from the areas of construction. In general, access roads shall be constructed to meet the needs of the Excavation Subcontractor to complete work but shall meet the following minimum requirements: (1) Geotextile fabric shall be placed over the existing ground surface in all areas where access roads are constructed; and (2) Clean material shall be placed over the geotextile fabric to construct the access roads at a minimum 8-inch thickness to ensure that construction equipment does not come in contact with the existing ground surface.

3.3.2 Staging and Support Areas

Staging and support areas shall be constructed by the Excavation Subcontractor to allow for the storage of construction-related materials including backfill and equipment. The area used for staging material and equipment shall be kept to a minimum and shall only include areas necessary to complete the work. All areas used for staging material and equipment shall have geotextile fabric placed on the existing ground surface and clean material placed over the fabric such that construction equipment and materials shall not come in contact with the existing ground surface.

END OF SECTION

SECTION 02300

EARTHWORK

PART 1 GENERAL

Work covered by this section includes measures to support remediation work within the Transition Area and restoration construction along the riverbed and riverbank (see Section 02930 BANK REVEGETATION TRANSITION AREA) and as shown on the drawings. The work consists of excavation of TSCA and non-TSCA materials (see Section 02111 HANDLING OF EXCAVATED MATERIAL AND BACKFILL), subgrade preparation, backfilling of the riverbed, retaining wall construction and other measures required to complete the work. Earthwork shall be accomplished by means selected and designed by the Excavation Subcontractor and acceptable to the General Contractor and the Government.

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 33	(1999) Concrete Aggregates
ASTM C 97	(1983; R 1998) Absorption and Bulk Specific Gravity of Natural Building Stone
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 1140	(1997) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	(1990; R 1996) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2167	(1994) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 2922 (1996) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D 2974 Moisture, Ash, and Organic Matter of Peat and Other Organic Materials

ASTM D 3017 (1988; R 1996) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

ASTM D 4318 (1998) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D 5519 (1994) Particle Size Analysis of Natural and Man-Made Soils

COMMONWEALTH OF MASSACHUSETTS,
DEPARTMENT OF HIGHWAYS

State Specifications (1988, R 1998) Standard Specifications for Highways and Bridges, as amended. The publication will be referred to as the "State Specifications"

ENGINEERING MANUALS (EM)

EM 1110-2-1906 (1986) Laboratory Soils Testing

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Pre-Construction Submittals

Excavation Plan

- Proposed construction sequence, including the order for driving, pulling, and removing steel sheet piling to construct Temporary Containment Cells per Phase 1 Specification requirements, the installation of groundwater cut-off sheet piles, the connection between the river centerline sheet pile to the groundwater cut-off sheet pile, the connection of the sheet pile to the dam support columns (H-piles, wide flange beam), the installation of H-piles, methods to be employed if and when subsurface obstructions are encountered, and the procedure for removing sheet pile both prior to the initiation of dam operation and at the completion of construction within Phase 2. The order for excavating channel sediment and bank soil shall be listed in the proposed construction sequence, with the conveyance of contaminated material over remediated areas minimized to the maximum extent practicable. The sequence for drilling caissons, installing soldier beams and permanent steel sheet pile retaining walls shall be included. Backfill placement methods and equipment shall be specified. The means and methods for incorporating and sequencing the temporary erosion control measures specified in

02370 STORMWATER AND EROSION CONTROL: IN-RIVER WORK shall be included.

- The method for coordinating survey control with the General Contractor during construction, and minimizing excavation volumes while ensuring that the work conforms to excavation grades shown in the Plans in accord with the tolerances listed in this Specification, shall be described.

- A dewatering plan that shows the location of all temporary dams, pumps, sumps, pipelines, filters, sedimentation basins, and other equipment necessary to handle leakage through and around the dam and infiltration of groundwater into the work area. The plan shall address the installation of a temporary dam at the downstream (discharge) end of the by-pass pipes to prevent the flow of water into the work area. The plan shall include a list of the products to be used for dewatering, subject to the approval of the Engineer. The piping materials, route to discharge to the river, and route to the water treatment system shall also be included in the plan. The plan shall include methods to minimize leakage into work areas and to prevent the discharge of suspended sediment to the treatment system. The plan may be modified and resubmitted as work proceeds in the event the Excavation Subcontractor elects to revise the work or materials described in the plan.

- A schedule for all specified earthwork and riverbank inspections that includes inspection frequencies and reporting, the names and addresses of all testing/inspection firms, qualifications of their personnel, and applicable permits and licenses.

- See additional requirements for the Excavation Plan listed in Specification Section 02111 – HANDLING OF EXCAVATED MATERIAL AND BACKFILL

SD-06 Test Reports

In-place compaction testing data.

Visual inspection reports.

1.3 SUBSURFACE DATA

Subsurface soil boring logs are available in the Pre-Design Summary, 1.5-Mile Removal Action - Phase 2. These data represent the subsurface information available; however, variations may exist in the subsurface between boring locations.

1.4 CLASSIFICATION OF EXCAVATION

Excavation specified shall be done on a classified basis, in accordance with the following designations and classifications.

1.4.1 Soil and Sediment Excavation

Soil and sediment excavation shall include the satisfactory removal of all materials not classified as boulder excavation, concrete excavation, embedded debris, or ordered excavation. Soil and sediment excavation shall include earthen and fill material located within the Limit of Excavation shown on the PLANS, except those specified below. As indicated on the subsurface investigation logs available in the Pre-Design Summary, 1.5-Mile Removal Action - Phase 2, soil and sediment includes: boulders and debris less than 2 feet in nominal diameter, concrete of less than 1 cubic yard volume, alluvial cobbles, gravel, sand, silt, clay, glacial till, and fill. Additionally, stumps and roots are considered incidental to the excavation of sediment and soil and are, therefore, included in this classification of excavation, but must be kept segregated from soil and sediment. Metallic debris is considered incidental to soil and sediment excavation.

1.4.2 Boulder Excavation

Boulder excavation shall include excavating boulders 2 feet or more in nominal diameter, measured along the narrowest portion of the boulder. Boulders that are less than 2 feet in diameter shall be considered part of soil and sediment excavation. If, at any time during excavation, the Excavation Subcontractor encounters material that may be classified as boulder excavation, such material shall be uncovered and the General Contractor notified by the Excavation Subcontractor. The Excavation Subcontractor shall not proceed with the excavation of this material until the General Contractor has classified the materials as soil and sediment excavation or boulder excavation and has taken field measurements as required.

1.4.3 Concrete

Concrete debris excavation shall include excavation of miscellaneous materials that are greater than 1 cy in nominal volume. The removal of concrete, sidewalk, pavement, and masonry pieces greater than 1 cy that may be encountered in the work shall be included in this classification. If, at any time during excavation, the Excavation Subcontractor encounters material that may be classified as embedded debris excavation, such material shall be uncovered and the General Contractor notified by the Excavation Subcontractor. The Excavation Subcontractor shall not proceed with the excavation of this material until the General Contractor and Contracting Officer have classified the materials as oversized.

1.4.4 Embedded Debris

Embedded debris shall include the removal of materials (concrete, miscellaneous debris, etc.) protruding from the riverbank or riverbed whose removal by conventional excavation may cause slope instability, result in the formation of a void, or require over-excavation, shall be considered embedded debris. Removal of embedded debris shall require the use of hydraulic hammers, saws, etc. to allow the removal of the debris to within 4 inches of the existing

ground surface or flush with the subgrade in areas that are to be excavated. Embedded debris shall be considered any embedded debris over 1 cy in nominal volume. The General Contractor shall be notified by the Excavation Subcontractor when potentially embedded debris is encountered. The Excavation Subcontractor shall not proceed with the excavation of this material until the General Contractor has classified the materials and has taken field measurements as required.

1.4.5 Ordered Excavation

Ordered excavation shall include excavating materials determined unsuitable or otherwise ordered by the Engineer. If, upon reaching specified subgrade, the Excavation Subcontractor encounters material that may be unsuitable for foundation of proposed structures or other proposed work, the General Contractor shall be notified by the Excavation Subcontractor. The Excavation Subcontractor shall not proceed with the excavation of this material until the General Contractor has classified the materials and has taken samples and field measurements as required.

1.5 BLASTING

Blasting will not be permitted.

1.6 UTILIZATION OF EXCAVATED MATERIALS

Unless otherwise directed, materials removed from excavations shall be carefully placed in sealed trucks provided by the Excavation Subcontractor such that contamination of the outside of the vehicle and leakage from the vehicle does not occur. Segregation of the various types of materials (TSCA and non-TSCA soil and sediment, stumps, boulders, and concrete) shall be maintained by placing these materials in designated trucks. No excavated material shall be reused on site for fill of any sort, or disposed of to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

1.7 CONSTRUCTION TOLERANCES

The finished excavation surface and fill/stone layer thickness shall not deviate from the lines and grades shown on the drawings unless directed by the Engineer. Excavation beyond the neatline will not be paid. The Excavation Subcontractor will be responsible for off-site transport and disposal of contaminated material resulting from unapproved over-excavation beyond the neatline tolerances provided below, as well as associated additional backfill costs. Tolerances are measured perpendicular to the indicated neatlines. Extreme limits of the tolerances given shall not be continuous in any direction for more than five times the nominal stone dimension nor for an area greater than 1,000 square feet of the surface.

Material	Deviation (feet)
Excavation/Subgrade	-0.15 to 0
Filter Material	-0.15 to +0.15
Common/Structural Fill	-0.15 to +0.15
Riprap	$-25\%d_{max}$ to $+15\%d_{max}$
Topsoil	0 to +0.15

d_{max} is the maximum nominal riprap size in feet

Due to the shape and size of riprap and the inherent difficulties associated with fine-grading riprap, a range of surface tolerance has been provided. Measurements of finished elevations for riprap shall be taken within a 12-inch radius of the horizontal location established on the subgrade.

The work shall be built to the required elevations, slope, and grade and the outer surfaces shall be even and present a neat appearance. Placed material not meeting these limits shall be removed or reworked as directed by the Engineer. Payment will not be made for excess material that the Engineer leaves in-place.

Excavation shall conform to the grades shown on the drawings. In the event of overexcavation beyond the neatline, the work shall be stopped.

PART 2 PRODUCTS

The backfill materials will be procured and delivered to the worksite by the Excavation Subcontractor in accordance with this specification and with Section 02111 HANDLING OF EXCAVATED MATERIAL AND BACKFILL. Physical/geotechnical testing shall be performed by the Excavation Subcontractor. Chemical testing shall be performed by the General Contractor. Test samples shall be representative samples taken in the presence of the Contracting Officer. The Excavation Subcontractor shall place the backfill materials in accordance with the drawings and specifications.

2.1 COMMON FILL

Common fill shall be obtained or produced from approved sources and shall consist of durable (non-calcareous) mineral soil and rock products. Common fill shall be free of organic materials, loam, wood, trash, or other objectionable materials which may be decomposable, compressible, or which cannot be properly compacted.

Material shall classify as CL, ML, CL-ML, SC, SM, SW, GC, GM, or GW according to the Unified Soil Classification System (USCS), unless otherwise approved by the Engineer for

use to construct a specific work element. Soils classified as CL or ML shall contain at least 20% sand-size particles per USCS.

Liquid limit shall not exceed 40 percent and plasticity index shall not exceed 10 percent.

Maximum clod size shall not exceed 4 inches.

Material shall have an organic content less than 6% as measured by ASTM D2974.

Material shall have a maximum dry density not less than 110 pounds per cubic foot (pcf) as determined by ASTM D1557, Method C, except for manufactured topsoil.

Common fill placed on riverbanks shall contain no rocks or rock fragments larger than one-half of the compacted thickness of the lift (refer to Paragraph 3.5 for lift thickness requirements) in which the material is placed and shall be such that no voids are left in the fill as constructed. Common fill shall have physical properties which permit its ready spreading and compacting. The moisture content of common fill shall be adjusted to provide the specified compaction and ensure a stable embankment.

Common Fill (Filter Grade) Sieve Size	**Percent Finer by Weight**
3-inch	100
2-inch	92 to 98
1-inch	82 to 95
½-inch	70 to 88
No. 4	55 to 73
No. 10	40 to 58
No. 40	20 to 31
No. 200	0 to 12

2.2 STRUCTURAL FILL

Structural fill shall be natural mineral soil consisting of hard, durable, granular aggregate and shall be free from roots, sod, rubbish, and other frozen, organic, or deleterious material. It shall conform to the following gradation requirements:

Sieve Size	Percent Finer by Weight
3-inch	100
2-inch	75 to 100
No. 4	40 to 100
No. 40	10 to 45
No. 200	0 to 12

2.3 FILTER MATERIAL

The filter material shall be well-graded and composed of hard, durable particles, and shall not contain organic matter, thin, flat and elongated pieces, or soft, friable particles in quantities considered objectionable by the Engineer. The aggregate shall meet the quality requirements of ASTM C33 and the gradational requirements specified in the following tables.

2.3.1 Filter Material

Filter material shall conform to gradational requirements and shall satisfy the State Specification for quality, durability, etc.:

Sieve Designation	Percent Lighter by Weight
6-inch	100
4-inch	65 to 97
3-inch	46 to 93
2½-inch	40 to 85
1-inch	0 to 69
½ inch	0 to 56
No. 4	0 to 38
No. 10	0 to 22
No. 40	0 to 5

2.4 STONE

Stone protection materials shall consist of hard, durable and sound quarried rock fragments furnished by and at the expense of the Excavation Subcontractor. Each stone shall have a density of not less than 165 pcf based on the saturated surface dry specific gravity

determined in accordance with ASTM C 97. The stones shall be irregular and angular in shape and shall be free from open or incipient cracks, seams, structural planes of weakness, or other defects that would tend to increase unduly their deterioration from natural causes and from handling and placing. No stone in the material shall have its long dimension exceeding 3 times its short dimension. Stone protection material shall be well-graded between the maximum and minimum stone sizes furnished. The maximum and minimum sizes furnished shall be selected to produce a material without "skip gradation" with stone sizes within the limits specified. All stones for the production of stone protection material shall be obtained from one general rock type in one quarry. The rock shall be selected and placed so that the entire finished surface of stone protection will be of uniform appearance.

2.4.1 Riprap

Only quarried stone shall be used. The minimum stone density shall be 165 pcf. Stone shall be hard, durable, and angular in shape, resistant to weathering and shall conform to the tables below. Material shall be well-graded and free of overburden, spoil, shale, and organic material.

In the following tables, the "(max)" size stone is the permissible maximum stone size and the "(min)" size stone is the permissible minimum size stone. Stone protection materials may contain up to 10 percent, by weight, of air-dried rock fragments, spalls, and dust with each particle weighing less than the permissible minimum stone size. No particles weighing less than the permissible minimum stone size shall be defined as a stone in stone protection materials. In computing percentages by weight of stone in the above table, the weight of particles weighing less than the permissible minimum stone size shall not be included in the total weight. Approximate stone size is provided for information only and is based on a specific gravity of 2.65.

9-inch Riprap

Approximate Stone Size in inches	Limits of Stone Weight in lb.	Percent Lighter by Weight
6.7 to 9.0	15 to 36(max)	100
5.2 to 6.0	7 to 11	50
3.4 to 4.6	2(min) to 5	15

12-inch Riprap

Approximate Stone Size in inches	Limits of Stone Weight in lb.	Percent Lighter by Weight
8.9 to 12.0	35 to 86(max)	100
7.0 to 8.0	17 to 26	50
4.6 to 6.0	5(min) to 13	15

18-inch Riprap

Approximate Stone Size in inches	Limits of Stone Weight in lb.	Percent Lighter by Weight
13.3 to 18.0	117 to 292(max)	100
10.5 to 12.0	58 to 86	50
7.1 to 9.5	18(min) to 43	15

2.5 SELECT GRANULAR FILL

Select granular fill shall be natural mineral soil consisting of durable (non-calcareous) granular aggregates. The gradation of the soil shall conform to the limits specified in the tables below and the maximum size of any stone or fragment shall not exceed two-thirds of the compacted thickness of the layer being placed. The material shall be obtained from sources approved by the Engineer.

2.5.1 Bank Run Gravel

Sieve Size	Percent Finer by Weight
6-inch	100
No. 4	25 to 70
No. 200	0 to 12

2.5.2 Select Gravel

Material shall conform to requirements of Massachusetts Highway Department (MHD) State Specification for material M1.03.0, Type b.

Sieve Size	Percent Finer by Weight
3-inch	100
1/2-inch	50 to 85
No. 4	40 to 75
No. 50	8 to 28
No. 200	0 to 10

2.6 PROCESSED AGGREGATES

Processed aggregates shall be obtained or produced from sources approved by Engineer, and shall consist of granular mineral soils having gradations as specified below:

2.6.1 Sand

Sieve Size	Percent Finer by Weight
3/8-inch	100
No. 200	0 to 10

2.6.2 Processed Gravel

Material shall conform to requirements of State Specification for material M1.03.1 Processed Gravel for Sub-base. (Material meeting State Specification M2.01.7 Dense Graded Crushed Stone for Sub-base will also be acceptable for gravel roadway applications.)

Sieve Size	Percent Finer by Weight
3-inch	100
1-1/2-inch	70 to 100
1/4-inch	50 to 85
No. 4	30 to 60
No. 200	0 to 10

2.6.3 Screened or Crushed Stone

Screened or crushed stone shall consist of clean, durable fragments of either ledge, rock, or boulders, or both, of uniform quality, reasonably free from thin or elongated pieces. Material shall conform to the gradation requirements of Massachusetts Highway Department (MHD) State Specification for material M2.01.1, M2.01.2, and M2.01.4.

Sieve Size	Percent Finer by Weight	
	3/4-inch Crushed Stone	1 1/2-inch Crushed Stone
2-inch	--	100
1 1/2-inch	--	95 to 100
1-inch	100	35 to 70
3/4-inch	90 to 100	0 to 25
1/2-inch	10 to 50	--
3/8-inch	0 to 20	--
No. 4	0 to 5	--

2.7 TOPSOIL

Replacement topsoil as specified in the Project Drawings will be derived from approved off-site sources. Topsoil shall have a texture of a loose friable loam with no admixture of refuse or material toxic to plant growth. Topsoil shall be free of stones, lumps, stumps, or similar objects larger than 2 inches in greatest diameter, subsoil, roots, weeds, sticks, leaves, paper, or any other deleterious materials.

Topsoil for this project is intended for application to well drained side slopes. The presence of the correct nutrients and pH status in the soil is necessary for healthy plant growth. All topsoil shall comply with ASTM D 5268 and shall be tested against the following requirements:

- Total Organic Matter between 4 and 12% by mass.
- Sand content between 20 and 60% by mass.
- Silt and clay content between 35 and 70% by mass.
- pH between 6 and 7.

2.8 GEOTEXTILE

Geotextile to be used behind the sheet pile retaining wall as part of the subsurface drainage system shall conform to the following mechanical and hydraulic properties. The geotextile

manufacture shall furnish a certificate of compliance (letter) that states that the geotextile manufactured and delivered to the site meets or exceeds the requirements of this specification along with quality control test results and the manufacturer's recommendations for handling, storage and installation.

Geotextile

Property	ASTM Test Method	Unit	Required Value[1]
Matrix	--		Nonwoven
Unit Weight[2]	D4833	oz/sy	8
Puncture Strength	D4751	lbs	100
Apparent Opening Size	D4632	min.	≤ No.80 sieve
Grab Strength (MD)	D4632	lbs	200
Grab Elongation	D4632	%	> 50
Trapezoidal Tear Strength	D4533	lbs	80
Mullen Burst Strength	D3786	psi	325
Permittivity	D4491	sec^{-1}	≥ 0.8
UV Resistance[3] (@500 hours)	D4355	% strength retained	> 70

NOTES:

[1]Minimum average roll value (MARV).

[2]For information only, not a required property.

[3]Manufacturer's certification required that states product meets or exceeds required value for typical roll values.

PART 3 EXECUTION

3.1 GENERAL EXCAVATION

The Excavation Subcontractor shall perform excavation of each type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Grading shall be in conformity with the typical sections shown and the tolerances specified. Unsatisfactory materials encountered within the limits of the work shall be stabilized in-place or excavated below grade and replaced as directed by the Engineer. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times.

3.1.1 Excavation of Riverbanks and Channel

Excavation of riverbanks and channel shall be accomplished by cutting accurately to the cross sections, grades, and elevations shown, or as directed. Riverbanks and channel shall not be excavated below grades shown. Excessive excavation shall be backfilled to grades shown with compacted common fill at the Excavation Subcontractor's expense. The Excavation Subcontractor shall maintain excavations free from detrimental quantities of water, leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.1.2 Excavation for Structures

Excavations shall be made to the lines, grades, and elevations shown, or as directed. Excavations shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Rock or other hard foundation material shall be cleaned of loose debris and cut to a firm, level, stepped, or serrated surface. Loose disintegrated rock and thin strata shall be removed. When concrete or masonry is to be placed in an excavated area, the bottom of the excavation shall not be disturbed.

3.2 SELECTION OF FILL MATERIAL

Fill material shall be selected to meet the requirements and conditions of the particular fill for which it is to be used. Fill material will be provided by the Excavation Subcontractor as described in Section 02111 HANDLING OF EXCAVATED MATERIAL AND BACKFILL.

3.3 OPENING AND DRAINAGE OF EXCAVATION

The Excavation Subcontractor shall notify the General Contractor sufficiently in advance of the opening of any excavation to permit elevations and measurements of the undisturbed ground surface to be taken.

The Excavation Subcontractor shall prepare plans detailing the proposed sequence of work. In-river work will be divided appropriately in accordance with these plans and shall proceed from one area to the next as indicated in the plan. Riverbank work shall proceed in coordination with in-river work to limit migration or erosion of existing bank soil into the work areas. Additionally, the work shall be coordinated such that conveying of contaminated material over restored areas is minimized to prevent releases of contaminated material to restored areas. Limits of riverbank work and final grades shall conform to the contract drawings.

The Excavation Subcontractor shall remove river water and provide adequate dewatering to prevent standing water in the excavation. Excavation Subcontractor shall be responsible for water management of all outfall pipes that discharge into the excavation area.

3.4 PREPARATION OF GROUND SURFACE FOR BACKFILL

3.4.1 General Requirements

Ground surface on which fill is to be placed shall be free of standing water; live, dead, or decayed vegetation; rubbish; debris; other unsatisfactory material; and compacted to a reasonably firm and stable surface. If excessively soft, yielding, and unstable areas are encountered, the Excavation Subcontractor shall, at the direction of the Engineer, undercut the soft material and replace it with 3-inch processed gravel or other engineer-approved material as required to achieve a stable subgrade surface. This material shall be placed and compacted to return the subgrade surface to the required elevation. Alternately, a soft area may be stabilized using a chocking technique which shall require the placement of gravel, as directed by the Engineer, on the soft area. The gravel shall be pushed into the soft material until a stable surface is achieved. The stabilized surface shall meet the permissible excavation tolerances.

3.4.2 Frozen Material

Backfill to support structures shall not be placed on a foundation that contains frozen material. All material below structures that freezes or has been subjected to freeze-thaw action during the construction work shall be thawed, dried, reworked, and recompacted to the specified criteria before additional fill material or the structure is placed.

3.5 BACKFILL PLACEMENT AND COMPACTION

The Excavation Subcontractor shall obtain approval for each work area excavation prior to backfilling. Common fill shall be used except where other materials are directed, specified, or shown on the plans. Compaction shall be accomplished with equipment acceptable to the Engineer. Backfill material shall not contain frozen clumps of soil, snow, or ice. Minimum compaction requirements expressed as a percentage of maximum density for various backfill types are as indicated in the following table and below:

Backfill Type	Compaction in Percent Maximum Dry Density	Maximum Loose Lift Thickness (inches)	
		Hand-operated compaction equipment	Heavy-duty compaction equipment
Common fill (Filter Grade)	85	6	12
Common fill (behind walls/riverbanks)	95	6	Not permitted.
Filter Material	Visual	6	12
Structural fill	95	6	12

Common fill shall be placed in loose, horizontal lifts and uniformly compacted to the percent maximum dry density, based on ASTM D 1557 Method C, as required in the table. Common fill placed on slopes may be accepted if the surface density is less than 92 percent, at the discretion of the Engineer.

Filter layer soils shall be placed in horizontal, loose lifts and uniformly compacted to at least 90 percent of maximum density according to ASTM D 1557 Method C. Filter layer soils placed on slopes may be accepted if the surface density is less than 90 percent, at the discretion of the Engineer.

Where common fill or filter material that conform to specified gradations are too coarse to permit testing with ASTM D1557 Method C, the Excavation Subcontractor shall develop a compaction method that achieves a uniformly dense, non-yielding condition acceptable to the Engineer. Compaction acceptance shall be based on visual approval of the completed lift.

Backfill shall not be placed behind walls until authorized by the Engineer. Backfill behind walls and on slopes shall be placed in horizontal lifts not exceeding 6 inches in loose thickness and uniformly compacted. Backfill adjacent to walls and on slopes supported by walls shall be compacted with hand-operated equipment to prevent eccentric loading upon or against the wall. Backfill shall be compacted to at least 95 percent of maximum dry density according to ASTM D1557 Method C.

Riprap shall be spread in uniform layers conforming to the limits shown on the plans. Placing and spreading equipment shall be used to eliminate voids, but no specific minimum compaction is required.

Topspoil shall be placed in one uniform loose lift and lightly compacted. No compaction testing is required.

3.6 GEOTEXTILES

Geotextile shall be secured to the rear face of precast wall panels and H-piles as shown on the drawings. At a minimum, the outer 2 inches of each strip must be bonded to the precast wall panel using an Engineer-approved bonding agent. The geotextile shall remain securely fastened to the wall during placement and compaction of backfill. Extreme care must be exercised when placing and compacting backfill behind the wall.

Geotextile shall be placed around the precast wall drainage aggregate as shown the drawings. The geotextile shall be placed on the prepared subgrade (i.e., the surface on which the geotextile is to be placed is free of protruding objects that could puncture the geotextile) and will completely encase the aggregate. Extreme care shall be exercised when placing drainage aggregate to ensure the geotextile is not damaged. Geotextile seams shall be formed by overlapping geotextile a minimum of 2 feet.

3.7 TESTING

In-place compaction testing shall be performed by the Excavation Subcontractor. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by or under the direct supervision of the Excavation Subcontractor and that the results are representative of the materials or conditions being certified by the tests. The Excavation Subcontractor shall perform proctor test results on the backfill materials as needed.

Field in-place density shall be determined in accordance with ASTM D 2922. ASTM D 1556 or ASTM D 2167 shall be used to check ASTM D 2922 calibration curves and may govern in the case of a discrepancy depending on test conditions and as directed by the Engineer. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using Annex A1 of Method D 2922. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made at the beginning of the job and at intervals as directed by the Engineer.

When test results indicate, as determined by the Engineer, that compaction is not as specified, the material shall be reworked or removed, replaced, and recompacted to meet specification requirements. Tests on recompacted areas shall be performed to determine conformance with specification requirements

3.7.1 Optimum Moisture and Laboratory Maximum Density

The Excavation Subcontractor shall transport the fill material to the work area for installation. The Excavation Subcontractor shall install the fill material such that the specified in situ densities are achieved. The Excavation Subcontractor shall condition the backfill materials to the approximate optimum moisture contents as necessary to achieve specified in situ densities.

3.7.2 In-Place Density

a. One test per 5,000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines, but not less than two tests per day when less than 5,000 square feet per day or lift is placed.

b. One test per 1,000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

3.7.3 Riprap Testing and Approval

The samples shall be subjected to such tests as are necessary to determine the quality of the material unless suitable test reports or service records are available that are satisfactory to the Engineer. Tests to determine the suitability of the rock and gravel materials may include, as applicable, petrographic analysis, specific gravity, abrasion, absorption, sulfate soundness, wetting and drying, and freezing and thawing. All testing of the initially proposed source of material will be made by or under supervision of the Engineer. The approval of a material by the Engineer, based on test results, examination of the material exposed at the source and service records, shall not relieve the Excavation Subcontractor, in any way, of the responsibility of placing a material which meets the requirements specified herein. Approval of a sample of material for soundness and durability from a source shall not be construed as approval of all material from that source. The right is reserved to reject, at any time, any or all portions of the materials in a source or products using the materials from that source when such materials are unsuitable in the opinion of the Engineer.

3.8 FINISHING

The surface of excavations, backfilled slopes, and subgrades shall be finished to a smooth and compact surface in accordance with the specified tolerances and the lines and grades shown on the plans.

3.9 PLACING TOPSOIL

On areas to receive topsoil, the compacted subgrade soil shall be scarified to a 2-inch depth for bonding of topsoil with subsoil. Topsoil then shall be spread evenly and graded to a depth sufficiently greater than that shown on the plans so that after natural settlement the completed work will conform to elevations shown on the plans.

Topsoil shall not be spread when frozen or excessively wet or dry. Material required for topsoil in excess of that produced by excavation within the grading limits shall be obtained from approved off-site areas.

3.10 PLACING

3.10.1 General

Common fill, filter material(s), and riprap shall be placed and compacted on the riverbed prior to placing restoration materials on banks. Restoration activities must progress from the riverbed to the bank. Bank restoration must proceed form the toe to the top of bank. In areas where retaining walls are to be installed, walls shall be installed prior to initiating restoration of the bank at that location.

3.10.2 Base Preparation

Areas on which filter layers and riprap are to be placed shall be graded and/or dressed to conform to cross sections shown on the contract drawings within the specified tolerance from the theoretical slope lines and grades. The Engineer shall approve the prepared base. Where such areas are below the allowable minus tolerance limit, they shall be brought to grade by fill with earth similar to the adjacent material and then compacted to a density equal to the adjacent in place material. Immediately prior to placing the filter layers, the Engineer will inspect the prepared base and no material shall be placed thereon until that area has been approved.

3.10.3 Placement of Filter Layers

3.10.3.1 Placement of Filter Layer Material on Prepared Base

Filter material shall be spread uniformly on the prepared base to the slope lines and grades as indicated on the contract drawings and in such manner as to avoid damage to the prepared base. Placement shall begin at the bottom of the area to be covered and continue up slope. Subsequent loads of material shall be placed against previously placed material in such a manner as to ensure a relatively homogenous mass. Placing of sand, gravel, and crushed stone by methods that tend to segregate the particle sizes within the filter layers or cause mixing of the separate layers will not be permitted. Each layer shall be finished to present an adequately even surface, free from mounds or windrows. Any damage to the surface of the prepared base during placement of the material shall be repaired before proceeding with the work. Compaction of the filter layer material shall be as described above.

3.10.4 Placement of Riprap

3.10.4.1 General

Riprap shall be placed on the filter layers within the limits shown on the contract drawings.

3.10.4.2 Placement

Riprap shall be placed in a manner that will produce a well-graded mass of rock with the minimum practicable percentage of voids, and shall be constructed, within the specified tolerances, to the lines and grades shown on the contract drawings or staked in the field.

Riprap shall be placed by means of truck, crane-operated skip-pan (box), dragline bucket, clamshell, rock-bucket, hydraulic excavator ("Gradall"), trackhoe, or other approved equipment. Pneumatic tired front-end loaders also may be used provided that, in the opinion of the Engineer, no degradation of the rock occurs.

Riprap shall be placed to its full course thickness in one operation and in such manner as to avoid displacing the filter material. The large stones shall be well distributed and the entire mass of stones in their final position shall be graded to conform to the gradation specified.

Placement shall begin at the bottom of the area to be covered and continue up slope. Subsequent loads of material shall be placed against previously placed material in such a manner as to ensure a relatively homogenous mass. The finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones.

Placing riprap in layers will not be permitted. Placing riprap by dumping it into chutes, or by similar methods likely to cause segregation of the various sizes, shall not be permitted. Placing riprap by dumping it at the top of the slope and pushing it down the slope shall not be permitted. Care shall be used if equipment is operated on the completed stone protection system.

The desired distribution of the various sizes of stones throughout the mass shall be obtained by selective loading of the material at the quarry or other source, by controlled dumping of successive loads during final placing, or by other methods of placement that will produce the specified results. Each truckload shall be representative of the gradation requirements.

Rearranging of individual stones shall be required to the extent necessary to obtain a well-graded distribution of stone sizes as specified above. Manipulating stone by means of dozers or other blade equipment may be permitted, if in the opinion of the Engineer, the underlying filter materials are not disturbed.

The Excavation Subcontractor shall maintain the stone protection until accepted by the Engineer and any material displaced prior to acceptance shall be replaced at the Excavation Subcontractor’s expense to the lines and grades shown on the contract drawings.

3.11 EQUIPMENT

No heavy-duty equipment, i.e., dozers, excavators, heavy-duty rollers, shall be operated on slopes. All backfill materials placed behind walls and on slopes behind walls shall be compacted using hand-operated compaction equipment.

END OF SECTION

SECTION 02360

DRILLED CONCRETE PIERS (CAISSONS)

PART 1 GENERAL

Work covered by this section includes the drilling of concrete piers (caissons) and the installation of soldier piles (steel sheet piles) for the support of a permanent retaining wall.

1.1 REFERENCES

The International Association of Foundation Drilling – Standards and Specifications

American Concrete Institute - ACI 336.1

1.2 SUBMITTALS

SD-01 Pre-Construction Submittals

Experience Certification

The Installer shall submit documentation supporting experience in successfully performing similar work detailed herein.

Schedule

Schedule estimating duration of drilling for each shaft or for each soil type.

Excavation Plan

Proposed sequence of work, (including sequence in which shafts will be drilled), equipment access to work areas, the type of casing to be used, if any, dewatering method proposed, methods to verify location and depth of shafts, methods to set and temporarily support/brace soldier piles, methods to assure correct alignment and spacing, concrete placement method, and methods used to protect completed shafts prior to concrete placement. Provide method to establish schedule for removal of temporary bracing (e.g., achievement of specified concrete strength). Provide plan showing locations of caissons and soldier piles.

SD-06 Test Reports

Test Results

The Installer shall submit the results of all tests performed in support of drilled shaft construction.

1.3 SUBSURFACE DATA

The Installer shall examine all available subsurface data for the project area. These data represent conditions at the point of exploration. Variations may exist between boring locations. At its option, the Installer may perform additional investigations and testing to better define the extent and composition of the site soils.

1.4 CLASSIFICATION OF EXCAVATION

Drilling shall be done on a classified basis in accordance with the following designations and classifications.

1.4.1 Soil Drilling

Soil drilling shall include the drilling of silt; clay; sand gravel; till; and miscellaneous debris such as concrete, brick, etc., using an auger.

1.4.2 Rock Drilling

Rock drilling shall include the drilling of intact bedrock, large boulders, and large debris that cannot be penetrated using an auger. Rock drilling shall not be initiated until approved by the Engineer.

1.5 BLASTING

Blasting will not be permitted.

1.6 QUALIFICATIONS

a. Installer—Company specializing in performing the work of this section with minimum 5 years documented experience in similar soil types. Company shall provide documentation as to type of equipment to be used, type of equipment available should selected equipment not be capable of completing drilled shafts, and experience of site superintendent on similar projects completed in similar soil types along with references.

1.7 CONSTRUCTION TOLERANCES

a. Horizontal location—Drilled shafts and soldier piles shall be set at locations along the alignment of the retaining wall shown on the Drawings such that the center-to-center spacing is no more than 10 feet 4 inches ± 3 inches. No soldier piles shall be installed within 8 feet of the upstream face of the Elm Street bridge without the approval of the Engineer.

b. Top elevation—The top elevation of soldier piles shall be elevation 975 ± 1 inch, as shown on the Drawings.

1.8 FIELD MEASUREMENTS

a. Verify that field measurements and survey benchmarks are as indicated on drawings.

PART 2 PRODUCTS

2.1 MATERIALS

a. Shaft Liner—temporary or permanent, material, length and diameter to be selected by the Installer to allow for completion of work.

b. Concrete—Shall have a minimum compressive strength of 3,000 psi at 28 days and shall meet the requirements of Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE for 4,000 psi concrete, with the exceptions of Subsection 1.3.2.2 and Subsection 1.3.4. For 3,000 psi, the maximum water-cement ratio shall be 0.58 for no air-entrained concrete, and 0.46 for air-entrained concrete. The 3,000 psi concrete shall have a maximum slump of 3 inches and a minimum slump of 1 inch. Higher strength concrete may be used with approval from the Engineer. An alternate mix design is required for concrete to be placed in water.

c. Soldier Piles—Shall be Skyline Steel AZ-26 ASTM D572 Grade 50 steel or approved equal.

d. Soldier Pile Lengths—Shall be as shown on the Drawings and as required herein.

PART 3 EXECUTION

3.1 PREPARATION

a. Use placement method(s) that will not cause damage to nearby structures.

b. Notify Engineer within a minimum seven (7) days before proceeding with the work.

c. Protect structures near the work from damage. The Installer shall be responsible for any damage caused to adjacent structures as a result of its operations.

3.2 INSTALLATION

a. Drill concentric and vertical pier shafts to 30-inch nominal inside diameter at the locations specified herein. Installer may, at its option and with the approval of the Engineer, drill larger diameter shafts.

b. Drill shafts to a depth of at least 15 feet below the subgrade elevation or to a depth of 6 feet into competent rock or very dense soils, whichever is encountered first. Dense soils and competent rock shall be determined by the Engineer based on, at a minimum, visual inspection. The Engineer may require the Excavation

Subcontractor to quantitatively assess the density/competency of the drilled materials.

c. Place temporary or permanent liners as necessary to maintain open shaft and to allow placement of concrete to the specified elevation.

d. Clean shaft and bottom of loose material. Maintain shaft during installation of concrete and soldier piles. Prevent "boiling" and heaving of shaft bottom using Engineer-approved methods. Maintain shafts free of water unless otherwise approved by the Engineer.

e. Allow inspection of shaft prior to placement of concrete.

f. Set soldier piles at approved locations as specified herein.

g. Install temporary bracing as necessary to secure the soldier piles in location. Remove bracing when concrete has sufficiently cured to support soldier piles.

h. Place concrete in accordance with Section 03300, CAST-IN-PLACE STRUCTURAL CONCRETE with equipment designed for vertical placement of concrete.

i. Progressively fill shaft. Do not permit top of soldier pile to drift from specified finished location.

j. Finish concrete such that surface slopes away from soldier pile approximately 6 inches above the excavated subgrade.

k. Notch sheet piles immediately adjacent to soldier pile location to fit around concrete shaft.

l. The Excavation Subcontractor shall be responsible for the disposal of all spoils and cuttings generated from the installation of drilled shafts in accordance with Section 02111 HANDLING OF EXCAVATED MATERIAL AND BACKFILL. Shaft cuttings shall be classified based on the classification of riverbed sediments at the boring location.

m. The Excavation Subcontractor shall be responsible for the handling and treatment of all water generated from the installation of drilled shafts in accordance with the dewatering plan to be prepared under Section 02300 EARTHWORK.

n. Prevent damage to soldier piles during installation of adjacent sheet piles.

3.3 FIELD QUALITY CONTROL

a. Accurately record the following:

1. Lengths and locations of shafts.

2. Sequence of placement.
3. Final base and top elevations.
4. Installed locations.
5. Soil type(s) encountered.
6. Description of drilling technique utilized.

3.4 UNACCEPTABLE PILES

a. Unacceptable Soldier Piles—Soldier piles that are placed out of position, are below the required top elevations, are not embedded to the required depth, are damaged and/or do not meet the tolerance requirements specified herein.

b. Removal of Unacceptable Soldier Piles—Remove unacceptable soldier piles and provide replacement drilled shafts and soldier piles at the correct locations and to the top and toe elevations required.

END OF SECTION

SECTION 02370

STORMWATER AND EROSION CONTROL: IN-RIVER WORK

PART 1 GENERAL

1.1 REFERENCES

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

AGRICULTURAL MARKETING SERVICE (AMS)

AMS Seed Act	(1995) Federal Seed Act Regulations Part 201

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 648	(1998c) Deflection Temperature of Plastics Under Flexural Load
ASTM D 698	(1998) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb f/cu. ft. (600kN-m/cu. m))
ASTM D 1248	(1998) Polyethylene Plastics Molding and Extrusion Materials
ASTM D 1560	(1992) Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus
ASTM D 1682	Tensile Strength and % Strength Retention of material after 1000 hours of exposure in Xenon Arc Weatherometer
ASTM D 1777	(1996) Thickness of Textile Materials
ASTM D 2844	(1994) Resistance R-Value and Expansion Pressure of Compacted Soils
ASTM D 3776	(1996) Mass per Unit Area (Weight) of Fabric
ASTM D 3787	(1989) Bursted Strength of Knitted Goods: Constant-Rate-of-Traverse (CRT), Ball Burst Test
ASTM D 3884	(1992) Test Method for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double Head Method)
ASTM D 4355	(1992) Deterioration of Geotextiles From Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
ASTM D 4439	(1997) Standard Terminology for Geosynthetics

ASTM D 4491	(1999) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(1991; R 1996) Trapezoidal Tearing Strength of Geotextiles
ASTM D 4595	(1986; R 1994) Tensile Properties of Geotextiles by the Wide-Width Strip Method
ASTM D 4632	(1991; R 1996) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1999) Determining Apparent Opening Size of a Geotextile
ASTM D 4833	(1998; R 1996) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4873	(1995) Identification, Storage, and Handling of Geosynthetic Rolls
ASTM D 4972	(1995) pH of Soils
ASTM D 5035	(1995) Breaking Force and Elongation of Textile Fabrics (Strip Method)
ASTM D 5268	(1996) Topsoil Used for Landscaping Purposes

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF HIGHWAYS

State Specifications	(1988, R 1998) Standard Specifications for Highways and Bridges, as amended. The publication will be referred to as the "State Specifications"

1.2 DESCRIPTION OF WORK

The work shall consist of furnishing and installing soil surface erosion and sediment control materials, stormwater control materials, and stormwater pollution prevention control materials including silt fence, hay bale barriers, diversion swales, fine grading, blanketing, stapling, mulching, and miscellaneous related work, within project limits and in areas outside the project limits where the soil surface is disturbed from work under this contract at the designated locations. This work shall include all necessary materials, labor, supervision, and equipment for installation of a complete system.

Areas requiring stormwater and temporary erosion control protection include:

a. Riverbanks after restoration and at elevations above the top-of-armor or riprap and at the top limit of restoration.

b. Riverbed work areas.

c. Areas around the outlet ends of diversion piping in successive Phase 2 locations as the remediation progresses.

d. Areas where riverbank overtopping may occur because of local increases in river stage associated with flow constriction caused by construction activity.

e. Areas where overland flow into the river from areas outside the top of the riverbanks has resulted in local erosion.

Additionally, the Excavation Subcontractor shall implement procedures to minimize stormwater flow damage to the site, remedial installations and appurtenances, and construction equipment. The Excavation Subcontractor shall be responsible for placement of all erosion control blankets as specified in this Section and in Section 02930 BANK REVEGETATION TRANSITION AREA.

In addition to the above erosion control activities, the Excavation Subcontractor will be responsible for preparation for an overtopping event and associated removal and reinstallation of the diversion dam. This will include the following general activities:

a. Monitoring of river flows and real-time communication/coordination with the General Contractor to monitor and report river flow conditions which could indicate an overtopping event.

b. Preparation for an overtopping event and removal and reinstallation of the diversion dam.

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Storm Damage and High Flow Damage Prevention Plan; G

a. Action levels for taking storm prevention measures.

b. Expected measures in the event a storm is predicted, including protection of work area and equipment.

c. In-River Remediation Area Work Plan in accordance with the requirements described in Subsection 1.4.2.3.

d. Stop Log Removal Plan, including detailed method of removal of stop logs, time required to remove stop logs under normal head and maximum head conditions, method of storage of stop logs, and method of replacing stop logs under normal and maximum head conditions.

SD-03 Product Data

a. Mulch; Geotextile Fabric; Erosion Control Blankets.

b. Manufacturer's literature including physical characteristics, and application and installation instructions.

c. Fertilizer

SD-06 Test Reports

a. Provide certification for synthetic soil binders showing USEPA registered uses, toxicity levels, and application hazards.

b. Provide the Construction Work Sequence Schedule including the installation of Temporary Erosion Controls where necessary.

c. Provide Installer's Qualifications. Include the installer's company name and address; training and experience; and/or certification.

d. For Mulch, provide composition and source.

e. For Asphalt Adhesive, provide composition.

f. For Tackifier, provide composition.

g. For Wood By-Products, provide composition, source, and particle size. Products shall be free from toxic chemicals or hazardous material.

SD-07 Certificates

Certification Form for Erosion and Sediment Controls

SD-10 Operation and Maintenance Data

a. Daily forecast reports for a period of 72 hours from the time of the forecast from a qualified weather forecasting service.

b. Average daily flow based on hourly measurements of river stage at Newell Street Bridge.

c. Rainfall/snow pack depth measurement/river stage and discharge data from the previous day.

d. Daily records of equipment, labor, and materials used to limit storm damage and high flow damage, and for implementing corrective action associated with storm damage and high flow damage.

e. Monthly Inspection Report for Erosion and Sediment Controls.

1.4 EROSION AND SEDIMENT CONTROLS

The controls and measures required for the Excavation Subcontractor are described below.

1.4.1 Stabilization Practices

The stabilization practices to be implemented shall include limiting the area of disturbance at any given time, installation of silt fences and/or hay bale berms and/or diversion swales and berms, rock check dams, and/or mulching, and/or erosion control mats.

On his daily CQC Report, the Excavation Subcontractor shall record the dates when the major grading activities occur (e.g., clearing and grubbing, excavation, backfilling, grading, and revegetation); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in Subsections 1.4.1.1 and 1.4.1.2, stabilization practices shall be initiated as soon as practicable, but after no more than 14 days, in any portion of the site where construction activities have temporarily or permanently ceased.

The Excavation Subcontractor shall maintain hay bale berms and/or rock check dams until revegetation is established to the satisfaction of the Engineer.

1.4.1.1 Unsuitable Conditions

Where the initiation of stabilization measures by the 14th day after construction activity temporarily or permanently ceases is precluded by unsuitable conditions caused by the weather, stabilization practices shall be initiated as soon as practicable after conditions become suitable.

1.4.1.2 No Activity for Less Than 21 Days

Where construction activity will resume on a portion of the site within 21 days from when activities ceased (e.g., the total time period that construction activity is temporarily ceased is less than 21 days), then stabilization practices do not have to be initiated on that portion of the site by the fourteenth day after construction activity temporarily ceased.

1.4.2 Structural Practices

Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit erosion/runoff and the discharge of pollutants from exposed areas of the site. Structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. Structural practices shall include the following devices:

a. Silt fences,
b. Straw bales, and/or
c. Other temporary erosion controls as described in Subsection 1.4.2.3.

1.4.2.1 Silt Fences

The Excavation Subcontractor shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g., clearing and grubbing, excavation, embankment, and grading). Final removal of silt fence barriers shall be upon approval by the Engineer.

1.4.2.2 Straw Bales

The Excavation Subcontractor shall provide bales of straw as a temporary structural practice to minimize erosion and sediment runoff. Bales shall be properly placed to effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, excavation, embankment, and grading) in each independent runoff area (e.g., after clearing and grubbing in an area between a ridge and drain, bales shall be placed as work progresses, bales shall be removed/replaced/relocated as needed for work to progress in the drainage area). Areas where straw bales are to be used are shown on the drawings. Final removal of straw bale barriers shall be upon approval by the Engineer.

Rows of bales of straw shall be provided as follows:

a. Along the downhill perimeter edge of all areas disturbed.

b. Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.

c. Along the toe of all cut slopes and fill slopes of the construction areas.

d. Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverse disturbed areas or carry runoff from disturbed areas. Rows shall be spaced as shown on the drawings.

e. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced as shown on the drawings.

f. At the entrance to culverts that receive runoff from disturbed areas.

1.4.2.3 In-River Remediation Area Work Plan

The Excavation Subcontractor shall prepare an In-River Remediation Area Work Plan, which will consist of narratives, supporting plans, drawings, and other documentation, as necessary, to adequately present and detail planned methods and procedures to be employed for

stormwater and erosion control within the riverbed/channel area during the Phase 2 remediation. The Work Plan will be subject to review and approval by the Engineer. At a minimum, the Work Plan shall describe and detail the following:

a. The phased sequencing and staging of the stormwater and erosion controls for the remediation throughout the Phase1/Phase 2 Transition Area of 1.5-Mile Reach. This shall include plan drawings depicting the projected work limits for each phase of the work. These plan drawings shall be prepared at a scale that can clearly depict the sequencing of the work within each phased work area to address:

    1. Temporary measures (i.e., small dikes/berms, bypass pumping, etc.) to divert extraneous flows entering the work area around excavation limits. These extraneous flows shall include runoff from areas bordering the river upstream and downstream of the dam, storm sewer outfalls, and incidental leakage flow through the aluminum stop log dam.

    2. Placement of temporary erosion controls (i.e., 12-inch [or larger] riprap, articulated concrete mats, erosion control blankets, and other engineer-approved controls) for locations within the river which have not fully been restored and are subject to the potential for erosion.

    3. Placement of temporary stabilization at the twin 54-inch diversion pipe outfall area at its successive, phased locations for the reach as the remediation proceeds downriver. At a minimum, this stabilization will require 12-inch (minimum) size riprap, extending 30 feet downstream of the pipe end.

b. The Work Plan narrative shall describe the logistics of how the in-river stormwater and erosion controls are to be implemented and placed within each phase work area limit. Specifically, the narrative will address how the measures and controls are to be placed with respect to the remedial excavation, construction of the hard armor walls, and the horizontal relocation of the twin 54-inch diversion pipes to allow for remedial excavation on the opposite side of the river. The narrative will also include description of those activities to be conducted in preparation for an overtopping event, including protection of exposed areas, securing/removal of diversion dikes/berms, removal of construction equipment, and removal/reinstallation of the dam.

1.5 DELIVERY, INSPECTION, STORAGE, AND HANDLING

Materials shall be stored in designated areas and protected from the elements, direct exposure, and damage as recommended by the manufacturer. Containers shall not be dropped from trucks. Material shall be free of defects that would void required performance or warranty. Geosynthetic binders and synthetic soil binders shall be delivered in the manufacturer's original sealed containers and stored in a secure area.

a. Erosion control blankets, silt fences, and geotextile fabric shall be furnished in rolls with suitable wrapping to protect against moisture and extended ultraviolet exposure

prior to placement. Erosion control blanket and geotextile fabric rolls shall be labeled to provide identification sufficient for inventory and quality control purposes.

b. Articulated concrete mats shall be handled in accordance with the manufacturer's requirements.

1.6 SUBSTITUTIONS

Substitutions will not be allowed without written request and approval from the Engineer.

1.7 INSTALLER'S QUALIFICATION

The installer shall be certified where recommended by the manufacturer for training and experience installing the material.

1.8 TIME LIMITATIONS

Backfilling the openings in synthetic grid systems and articulated cellular concrete block systems shall be completed a maximum 7 days after placement to protect the underlying geotextile material from ultraviolet radiation.

1.9 WARRANTY

Erosion control material shall have a warranty for use and durable condition for project specific installations. Temporary erosion control materials shall carry a minimum 18-month warranty. Permanent erosion control materials shall carry a minimum 3-year warranty.

PART 2 PRODUCTS

2.1 RESTORED RIVERBANK EROSION PROTECTION COMPONENTS

2.1.1 Recycled Plastic

Recycled plastic shall contain a minimum 85% of recycled post-consumer product. Recycled material shall be constructed or manufactured with a maximum ¼-inch deflection or creep in any member, according to ASTM D 648 and ASTM D 1248. The components shall be molded of ultraviolet (UV) and color stabilized polyethylene. The material shall consist of a minimum 75% plastic profile of high-density polyethylene, low-density polyethylene, and polypropylene raw material. The material shall be non-toxic and have no discernible contaminants such as paper, foil, or wood. The material shall contain a maximum 3% air voids and shall be free of splinters, chips, peels, buckling, and cracks. Material shall be resistant to deformation from solar heat gain.

2.1.2 Binders

2.1.2.1 Geosynthetic Binders

Geosynthetic binders shall be manufactured in accordance with ASTM D 1560, ASTM D 2844; and shall be referred to as products manufactured for use as modified emulsions for the purpose of erosion control and soil stabilization. Emulsions shall be manufactured from all natural materials and provide a hard durable finish.

2.1.3 Mulch

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

2.1.3.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.1.3.2 Hay

Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings, furnished in an air-dry condition suitable for placing with commercial mulch-blowing equipment.

2.1.3.3 Wood Cellulose Fiber

Wood cellulose fiber shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: a minimum 9 to a maximum 15% moisture, and between a minimum 4.5 to a maximum 6.0 pH.

2.1.3.4 Paper Fiber

Paper fiber mulch shall be recycled newsprint that is shredded for the purpose of mulching seed.

2.1.3.5 Shredded Bark

Locally shredded material shall be treated to retard the growth of mold and fungi.

2.1.3.6 Wood Chips and Ground Bark

Locally chipped or ground material shall be treated to retard the growth of mold and fungi. Gradation: A maximum 2-inch wide by 4-inch long.

2.1.3.7 Mulch Control Netting

Mulch control netting may be constructed of lightweight recycled plastic, cotton, or paper or organic fiber. The recycled plastic shall be a woven or non-woven polypropylene, nylon, or polyester containing stabilizers and/or inhibitors to make the fabric resistant to deterioration from UV, and with the following properties:

a. Minimum grab tensile strength (TF 25 #1/ASTM D 4632), 180 pounds.
b. Minimum Puncture (TF 25 #4/ASTM D 3787), 75 psi in the weakest direction.
c. Apparent opening sieve size of a minimum 40 and maximum 80 (U.S. Sieve Size).
d. Minimum Trapezoidal tear strength (TF 25 #2/ASTM D 4533), 50 pounds.

2.1.3.8 Hydraulic Mulch

Hydraulic mulch shall be made of 100% virgin aspen wood fibers. Wood shall be naturally air-dried to a moisture content of 10.0%, plus or minus 3.0%. A minimum of 50% of the fibers shall be equal to or greater than 0.15-inch in length and a minimum of 75% of the fibers shall be retained on a 28-mesh screen. No reprocessed paper fibers shall be included in the hydraulic mulch. Hydraulic mulch shall have the following mixture characteristics:

Characteristic (typical)	**Value**
pH	5.4 $\pm$ 0.1
Organic Matter (oven-dried basis)	99.3% within $\pm$ 0.2
Inorganic Ash (oven-dried basis)	0.7% within $\pm$ 0.2
Water Holding Capacity	1,401%

2.1.3.9 Tackifier

Organic tackifier shall be derived from natural organic plant sources containing no growth or germination inhibiting materials. Inorganic tackifier shall be a blended polyacrylimide material or equivalent approved by Engineer. When combined with fiber and water it shall have the property of even dispersion and suspension. After it has dried, the binder shall not dissolve or disperse upon rewetting.

2.1.3.10 Dye

Dye shall be a water-activated, green color. Dye shall be pre-packaged in water dissolvable packets in the hydraulic mulch.

2.1.4 Geotextile Fabrics

Geotextile fabrics shall be woven of polypropylene filaments formed into a stable network so that the filaments retain their relative position to each other. Sewn seams shall have strength equal to or greater than the geotextile itself. Fabric shall be installed to withstand maximum velocity flows as recommended by the manufacturer.

The geotextile shall conform to the following minimum average roll values:

Property	Performance	Test Method
Weight		ASTM D 3776
Thickness		ASTM D 1777
Permeability		ASTM D 4491
Abrasion Resistance	58% X	
Type (percent strength retained)	81%	ASTM D 3884
Tensile Grab Strength	1,467 N X 1, 933N	ASTM D 4632
Grab Elongation	15% X 20%	ASTM D 4632
Burst Strength	5,510 kN/m^2	ASTM D 3787
Puncture Strength	733 N	ASTM D 4833
Trapezoid Tear	533 N X 533 N	ASTM D 4533
Apparent Opening Size	40 U.S. Std Sieve	ASTM D 4751
UV Resistance @ 500 hr	90%	ASTM D 4355

2.1.5 Erosion Control Blankets

Requirements for Erosion Control Blankets are specified in Specification Section 02930 BANK REVEGETATION TRANSITION AREA.

2.1.5.1 Staking

Stakes shall be 100% biodegradable manufactured from recycled plastic or wood and shall be designed to safely and effectively secure erosion control blankets for temporary or permanent applications. The biodegradable stake shall be fully degradable by biological activity within a reasonable time frame. The bio-plastic resin used in production of the biodegradable stake shall consist of polylactide, a natural, completely biodegradable substance derived from renewable agricultural resources. The biodegradable stake must exhibit ample rigidity to enable it to be driven into hard ground, with sufficient flexibility to resist shattering. The biodegradable stake shall have serrations on the leg to increase resistance to pull-out from the soil. The biodegradable stake shall be at least 12 inches in length or as recommended by the manufacturer of the net or matting with which the stakes are to be used.

2.1.6 Synthetic Grid and Sheet Systems

Synthetic grid and sheet systems shall be formed of recycled plastic in accordance with Subsection 2.1.1 and have interlocking components to form a uniform under-layment or strata to receive fill.

2.1.7 Components for Silt Fences

2.1.7.1 Filter Fabric

The geotextile shall comply with the requirements of ASTM D 4439, and shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85% by weight of ester, propylene, or amide, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 to 120^{o} F. The filter fabric shall meet the following requirements, listed in Table 02370-1.

Table 02370-1 - Filter Fabric for Silt Screen Fence

Physical Property	Test Procedure	Strength Requirement
Grab Tensile Elongation (%)	ASTM D 4632	100 lb. min. 30 % max.
Trapezoid Tear	ASTM D 4533	55 lb. min
Permittivity	ASTM D 4491	0.2 sec to1
AOS (U.S. Std Sieve)	ASTM D 4751	20 to 100

2.1.7.2 Silt Fence Stakes and Posts

The Excavation Subcontractor may use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction shall have a minimum cross-section of 2 inches by 2 inches when oak is used and 4 inches by 4 inches when pine is used, and shall have a minimum length of 4 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 5 feet.

2.1.7.3 Mill Certificate or Affidavit

A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet the chemical, physical, and manufacturing requirements specified above. The mill certificate or affidavit shall specify the actual Minimum Average Roll Values and shall identify the fabric supplied by roll identification numbers. The Excavation Subcontractor shall submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

2.2 COMPONENTS FOR TEMPORARY EROSION CONTROLS FOR IN-RIVER WORK

Riprap and articulated concrete mats will be provided by the Excavation Subcontractor.

2.2.1 Riprap

Material shall be either 12-inch or 18-inch riprap meeting the requirements described in Section 02300, EARTHWORK.

2.2.2 Articulated Concrete Mat Components

2.2.2.1 Articulated Concrete Block Mats

Use Armortec ArmorFlex Articulating Concrete Block Revetment System with 30s concrete blocks, or an equivalent subject to the approval of the Engineer.

Concrete Block Specifications are listed in the following table:

Concrete block class: 30s Open cell Block dimensions: Length: 13.0 inches Width: 11.6 inches Height: 4.75 inches Gross Area: ~ 1 square foot Block weight: 31 to 36 lb Open area: 20%
Minimum Physical Requirements: Compressive strength of 4,000 psi Max absorption of 12 pcf Specific weight of 130 to 150 pcf

The concrete blocks will be linked together with flexible cable that runs through the entire block or designed to be interlocking if an equivalent does not require cables.

2.2.2.2 Geotextile

The geotextile shall comply with the requirements of ASTM D 4439, and shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. Armortec 70/20, or a suitable alternative subject to the approval of the Engineer shall be used. The filter fabric shall meet the following requirements, listed in Table 02370-2.

Table 02370-2 - Filter Fabric for Articulated Concrete Block Mat System

Physical Property	Test Procedure	Strength Requirement
Grab Tensile Elongation (%)	ASTM D 4632	275 lb. min. 30% max.
Trapezoid Tear	ASTM D 4533	105 lb. min
Permittivity	ASTM D 4491	0.506 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	50

2.3 LOCAL EROSION AREAS PROTECTION

Local erosion areas protection backfill includes placing temporary riprap in locations described in the In-River Remediation Area Work Plan and as required by the Engineer. When directed by the Engineer to place the erosion protection as a temporary measure, the Excavation Subcontractor shall first place geotextile over the area to be protected, followed by placing the riprap over the geotextile.

PART 3 EXECUTION

3.1 CONDITIONS

The Excavation Subcontractor shall submit a construction work sequence schedule in the Excavation Plan referenced in Section 02300 EARTHWORK. The work schedule shall coordinate the timing of land disturbing activities with the provision of erosion control measures. Erosion control operations shall be performed under favorable weather conditions; when excessive moisture, frozen ground, or other unsatisfactory conditions prevail, the work shall be stopped as directed. When special conditions warrant a variance to earthwork operations, a revised construction schedule shall be submitted for approval. Erosion control materials shall not be applied in adverse weather conditions (e.g., during storms, when ground is frozen, etc.), which could affect their proper installation and performance.

3.2 SITE PREPARATION

3.2.1 Existing Grade

The Excavation Subcontractor shall verify that existing grades are as indicated on the drawings, prior to the commencement of the work. The location of underground utilities and facilities in the area of the work shall be verified and marked. Damage to underground utilities and facilities shall be repaired at the Excavation Subcontractor's expense.

3.2.2 Layout

Erosion control material locations may be adjusted to meet field conditions. When soil tests result in unacceptable particle sizes, a shop drawing shall be submitted indicating the corrective measures.

3.2.3 Protecting Existing Vegetation

When there are established lawns in the work area, the turf shall be covered and/or protected or replaced after construction operations. Existing trees, shrubs, and plant beds that are to be preserved shall be barricaded along the drip-line. Damage to existing trees, shrubs, and plant

beds shall be mitigated by the Excavation Subcontractor at no additional cost to the Government. Damage shall be assessed by a state-certified arborist or other approved professional using the National Arborist Association's tree valuation guideline.

3.3 EXECUTION

3.3.1 Restored Riverbank Erosion Protection

3.3.1.1 Placement of Erosion Control Blankets

Before placing the erosion control blankets, ensure the subgrade has been graded smooth; has no depressed, void areas; and is free from obstructions, such as tree roots, projecting stones, or other foreign matter. Vehicles shall not be permitted directly on the blankets.

3.3.1.2 Installation of Silt Fences

Silt fences shall extend a minimum of 16 inches above the ground surface and shall not exceed 34 inches above the ground surface. Filter fabric shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 6-inch overlap, and securely sealed. A trench shall be excavated approximately 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the Engineer.

3.3.1.3 Installation of Straw Bales

Straw bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales to prevent deterioration of the bindings. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. After the bales are staked and chinked (gaps filled by wedging with straw), the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier. Loose straw shall be scattered over the area immediately uphill from a straw bale barrier to increase barrier efficiency. Each bale shall be securely anchored by at least two stakes driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 18 inches deep into the ground to securely anchor the bales.

3.3.1.4 Mulch Installation

Mulch shall be installed in areas indicated by the Engineer. Mulch shall be applied evenly at a uniform coverage thickness of approximately 3 inches.

3.3.1.5 Non-Hydraulic Mulch Installation

Mulch shall be applied in the areas indicated. Straw or hay mulch shall be applied evenly at a rate of 2 tons per acre. Wood chips shall be applied at a rate of 6 tons per acre. If wood chips are used, mulch application must include 10 pounds of nitrogen (slow release form such as IBDU [isobutylidene diurea]) per ton of wood chips in addition to other fertilizer requirements. The mulch shall be anchored by application of a commercially available tackifier at the rate recommended by the manufacturer, a mechanical anchor, or mulch netting.

3.3.1.6 Mechanical Anchor

Mechanical anchor shall be a V-type wheel land packer, a scalloped-disk land packer designed to force mulch into the soil surface, or other suitable equipment.

3.3.1.7 Non-Asphaltic Tackifier

Hydrophilic colloid shall be applied at the rate recommended by the manufacturer, using hydraulic equipment suitable for thoroughly mixing with water. A uniform mixture shall be applied over the area.

3.3.1.8 Asphalt Adhesive-Coated Mulch

Hay or straw mulch may be spread simultaneously with asphalt adhesive applied at a rate between 10 to 13 gallons per 1,000 square feet, using power mulch equipment which shall be equipped with suitable asphalt pump and nozzle. The adhesive-coated mulch shall be applied evenly over the surface. Sunlight shall not be completely excluded from penetrating to the ground surface.

3.3.1.9 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

Wood cellulose fiber, paper fiber, or recycled paper shall be applied as part of the hydraulic mulch operation.

3.3.1.10 Hydraulic Mulch Application

a. Unseeded Area

Hydraulic mulch shall be installed as indicated and in accordance with manufacturer's recommendations. Hydraulic mulch shall be mixed with water at the rate recommended by the manufacturer for the area to be covered. Mixing shall be done in equipment manufactured specifically for hydraulic mulching work, including an agitator in the mixing tank to keep the mulch evenly disbursed. Hydraulic mulch applications shall be anchored by application of a commercially available tackifier at the rate recommended by the manufacturer.

b. Seeded Area

Hydraulic mulch shall be applied evenly at the rate of 1.5 tons per acre or as recommended by the manufacturer. For hydraulically seeded areas, mulch shall be applied at a rate of 1 ton per acre with the seed and fertilizer, and at a rate of 0.5 tons per acre in the second application of mulch only. Hydraulic mulch applications shall be anchored by application of a commercially available tackifier at the rate recommended by the manufacturer.

3.3.1.11 Erosion Control Blankets

a. Erosion control blankets shall be installed as indicated and in accordance with manufacturer's recommendations.

b. Erosion control blankets shall be oriented in vertical strips and anchored with staples, as indicated. Adjacent strips shall be abutted to allow for installation of a common row of staples. Horizontal joints between erosion control blankets shall be overlapped sufficiently to accommodate a common row of staples with the uphill end on top.

c. Where exposed to overland sheet flow, a trench shall be located at the uphill termination. The erosion control blanket shall be stapled to the bottom of the trench. Backfill and compact the trench as required.

d. Where terminating in a channel containing an installed blanket, the erosion control blanket shall overlap installed blanket sufficiently to accommodate a common row of staples.

3.3.2 Stormwater Damage Prevention Measures, Monitoring, and Site Restoration

3.3.2.1 Preparation for Storm Events

The Excavation Subcontractor shall perform the following duties to prepare for storm events to minimize the potential for damage to the site, installations, equipment, and appurtenances:

a. Provide necessary instrumentation and personnel to monitor rainfall and flow in the river.

b. Monitor 72-hour weather forecasts from a qualified private firm, or from a governmental agency that provides weather forecast services (e.g., weather forecasts available through the National Weather Service [NWS] from the Pittsfield Municipal Airport) to aid in determining that a flood is likely to occur.

c. Monitor river stage twice daily at a minimum, at the beginning and end of each day, using the USGS 01197000 East Branch Housatonic River at Coltsville, MA, gage station by (a) obtaining provisional real-time stream flow data from the USGS web site [http://water.usgs.gov/ma/nwis/uv?01197000]; and/or (b) by contacting the USGS office in Northboro, MA, at (508) 490-5058. During times of high flow (i.e., during and after storms and snowmelt), stage shall be monitored every 4 hours at a minimum.

d. Implement appropriate flood contingency actions, as described in the Storm Damage and High Flow Damage Prevention Plan to minimize damage and construction delays.

e. Restore the active work area following the flood.

Note: The Excavation Subcontractor will need to monitor rainfall and river flow during the normal work week, and also during times not included in the normal work week (e.g., evenings, weekends, holidays).

3.3.2.2 Stormwater Damage Prevention Measures

Elements of the design are specifically intended to maintain the site in a condition that minimizes the negative impacts of flooding the active in-river work area.

In addition to the specific design elements, the Excavation Subcontractor shall observe the following minimum practices:

a. Remove all equipment from the in-river work area and any area subject to flooding prior to an expected flood.

b. Maintain a clean work area. Do not store material or equipment that may be damaged or lost during a flood within the in-river work area.

c. When the work, including stormwater damage prevention and/or repair, cannot proceed because of stormwater and/or high flows, the Excavation Subcontractor shall notify the General Contractor. If the General Contractor and the Government agree that the work cannot proceed, they will approve Stand-by status for the Excavation Subcontractor. Stand-by status shall not apply to normally occurring seasonal high river flows associated with precipitation and/or snowmelt, nor shall it apply to prolonged periods of precipitation that significantly exceed seasonal averages.

3.3.2.3 Monitoring to Anticipate a Flood Event

The Excavation Subcontractor shall monitor rainfall and river flow to determine whether a flood is likely to occur. The Excavation Subcontractor shall begin preparing the work area to be inundated by implementing the actions identified above if directed to do so by the Government or the General Contractor, or if the following condition is met:

a. The river flow as measured by USGS Coltsville Gaging Station is observed to exceed the maximum flow of the diversion system, and/or water impounded by the dam is rising. Or, the flow measured at the USGS Coltsville Gaging Station is rising and current or forecasted weather conditions project extended precipitation to cause flooding conditions such that the maximum flow of the diversion system will be exceeded.

The Excavation Subcontractor must consider the current flow in the river (USGS Coltsville Gaging Station), current and forecasted weather conditions, existing flow and stage conditions of the river, saturation levels of the banks and floodplain due to prior or current precipitation, and where current construction activities are taking place when monitoring for anticipated flood events.

3.3.2.4 Preparing the Project for a Flood Event

Once the Excavation Subcontractor has determined that a flood event is likely, there is a limited period of time in which to prepare for the flood. Depending on the intensity of rainfall, preparation time may be as little as a few hours. If any of the alert conditions identified in Subsection 3.3.2.3 is met, the Excavation Subcontractor shall immediately implement the following actions:

a. Remove all equipment and materials from all areas that may be subject to damage or loss during a flood event.

b. Upon approval of the Engineer, cease dewatering the active in-river work area and allow it to flood from within before the rising floodwaters overtop the sheet pile walls.

c. Inform the General Contractor in the event further work cannot proceed.

d. Based on direction provided by the Government and the General Contractor, remove the stop log dam in accordance with approved removal plan.

3.3.2.5 Restoring the Site after a Flood Event

After a flood event, the Excavation Subcontractor shall inspect the work area to identify and assess the extent of damage. The integrity of the sheet pile wall or other barriers used to create work cells will be evaluated prior to dewatering the work area. Dewatering of the work

area will be necessary to complete the inspection of the riverbed within the work area. The inspection shall include the following specific observations:

a. Inspection of the sheet pile walls and other barriers and surrounding soil/sediment to determine if they have been deformed, weakened, are potentially compromised due to scour near the base of the wall, or rendered ineffective as a result of the flood.

b. Inspection of the riverbank on both sides of the river to document the extent of scour or erosion that occurred adjacent to or within the active work area during the flood event.

c. Inspection, or if deemed necessary by the Engineer, a bathymetric survey of the riverbed within the active work area to determine if scour or deposition has affected the results of excavation accomplished prior to the flood event.

Upon completion of the inspection, deposited sediment will be excavated from the work area, and scoured areas within the work area will be backfilled as directed subject to the approval of the Engineer. In addition, the Excavation Subcontractor shall re-excavate any other areas as required by the Engineer.

When conditions prevail that do not allow the Excavation Subcontractor to access the work area and perform excavation, backfill, flood damage prevention, and/or flood damage correction activities, the Excavation Subcontractor shall go on Stand-by status, subject to the approval of the Engineer.

The Excavation Subcontractor may resume excavation work after the work area has been dewatered, resurveyed by the General Contractor if necessary, and any necessary repairs have been made to ensure the integrity of the sheet pile walls or other excavation shoring methods.

3.3.3 Temporary Erosion Protection for In-River Areas

Depending upon expected seasonal flow conditions at the time of construction and during in-river work, temporary erosion protection controls may be constructed in accord with the options described below, or a suitable alternative may be used, subject to the approval of the Engineer.

3.3.3.1 Installation and Removal of Riprap

Upon specific direction from the Engineer, the Excavation Subcontractor shall place riprap as shown on the In-River Work Plan drawings. The riprap shall be placed in such a way and from a drop height to minimize disturbance of riverbank soil and riverbed sediment, and to prevent damaging the diversion pipes or hard armor walls. Handwork is expected to be necessary to place the riprap against these structures.

The temporary riprap located within the river shall be removed after receiving approval from the Engineer. After the riprap is removed, it shall be placed in trucks provided by the Excavation Subcontractor for transport to the decontamination area and pressure-washing to remove adhered soil and sediment. The Excavation Subcontractor shall reuse the riprap, after inspection and approval by the Engineer.

3.3.3.2 Installation and Removal of Articulated Concrete Block Mats around Containment Cells

Upon specific direction from the Engineer, the Excavation Subcontractor shall place articulated concrete block mats as shown on the In-River Work Plan Drawings. The Excavation Subcontractor shall first place geotextile over the existing ground surface. The Excavation Subcontractor shall then place the mats on the geotextile, using a lifting beam that lifts the mats from both ends, per the manufacturer's instructions, minimizing disturbance of riverbank soil and riverbed sediment, and preventing damage to the diversion pipes or hard armor walls. Temporary anchorage can be accomplished by driving wooden stakes along the top of the mat.

The mats may be moved to allow for relocation of the diversion pipes or removal after receiving approval from the Engineer. The mats shall be lifted from both ends, using the lifting beam. After the mats are removed, they shall be placed in trucks provided by the General Contractor for transport to the decontamination area and pressure-washing to remove adhered soil and sediment. The Excavation Subcontractor shall reuse the mats after inspection and approval by the Engineer.

3.3.4 Temporary Erosion Protection for Areas of Construction-Related Riverbank Overtopping

These areas shall be identified in the field by the Excavation Subcontractor and include areas on the riverbank where flooding may occur due to increased local stage associated with the remedial work.

The Excavation Subcontractor shall place and maintain sand bags in these areas to an elevation equal to the surrounding topography to minimize overtopping due to local increases in river stage.

3.3.5 Erosion Protection for Areas Eroded by Overland Flow

Prior to preparing the Request for Bid from the Excavation Subcontractor, the General Contractor shall identify these areas. The Excavation Subcontractor shall place quarry spalls in these areas to restore the elevation of these areas to approximate the surrounding topography, and to provide increased resistance to future erosion.

3.4 CLEANUP

Excess material, debris, and waste materials shall be disposed of off site at an approved landfill or recycling center. Adjacent paved areas shall be cleared. Immediately upon completion of the installation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed. Signage shall be in accordance with the specifications.

3.5 WATERING SEED

Watering shall be started immediately after installing erosion control blankets. Water shall be applied to supplement rainfall at a sufficient rate to ensure 1½ inches of rainfall equivalent per week and to maintain moist soil conditions to a minimum 1-inch depth. Runoff and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.6 MAINTENANCE RECORD

A record shall be furnished describing the maintenance work performed, record of measurements and findings for product failure, recommendations for repair, and products replaced.

3.6.1 Maintenance

The Excavation Subcontractor shall maintain erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness and by repair of erosion and sediment control measures and other protective measures. Maintenance shall include protecting embankments and ditches from surface erosion and protecting installed areas from traffic.

The Excavation Subcontractor shall maintain the temporary and permanent vegetation by restoration of destroyed vegetative cover. Maintenance shall include eradicating weeds and protecting installed areas from traffic.

The following procedures shall be followed to maintain the protective measures.

3.6.1.1 Maintenance Instructions

Written instructions containing drawings and other necessary information shall be furnished, describing the care of the installed material, including when and where maintenance should occur, and the procedures for material replacement.

3.6.1.2 Patching and Replacement

Unless otherwise directed, material shall be placed, seamed or patched as recommended by the manufacturer. Material not meeting the required performance as a result of placement, seaming, or patching shall be removed from the site. The Excavation Subcontractor shall replace the unacceptable material at no additional cost to the General Contractor.

3.6.1.3 Silt Fence Maintenance

Silt fences shall be inspected in accordance with Subsection 3.8. Any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third of the height of the barrier. When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall receive erosion control and shall be seeded as directed by the Engineer.

3.6.1.4 Straw Bale Maintenance

Straw bale barriers shall be inspected in accordance with Subsection 3.8. Close attention shall be paid to the repair of damaged bales, end runs, and undercutting beneath bales. Necessary repairs to barriers or replacement of bales shall be accomplished promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. Bale rows used to retain sediment shall be turned uphill at each end of each row. When a straw bale barrier is no longer required, it shall be removed. The immediate area occupied by the bales and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded in accordance with the specifications.

3.6.1.5 Rock Outfall Protection Maintenance

Rock outfall protection shall be inspected in accordance with Subsection 3.8. Close attention shall be paid to erosion of the quarry spalls during dewatering of containment cells and after every rainfall event. If outlet protection fails, the Excavation Subcontractor shall repair the failed section and replace the Modified Rockfill with an 18-inch-thick layer of 12-inch riprap, as directed by the Engineer.

3.7 SATISFACTORY STAND OF GRASS PLANTS

When erosion control blankets are installed, the grass plants shall be evaluated for species and health when the grass plants are a minimum 1-inch high. A satisfactory stand of grass plants from the revegetation mat area shall be a minimum 10 grass plants per square foot. Grass plant areas will be accepted only upon attainment of a reasonably thick, uniform stand

of the grasses and herbaceous plants from the specified seed mix and from volunteer growth, free from sizable thin or bare areas.

3.8 INSPECTIONS

3.8.1 General

The Excavation Subcontractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every 7 calendar days and within 24 hours of the end of any storm that produces 0.5 inch or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month.

3.8.2 Inspections Details

Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Environmental Protection Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of off-site sediment tracking.

3.8.3 Inspection Reports

For each inspection conducted, the Excavation Subcontractor shall prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Environmental Protection Plan, maintenance performed, and actions taken. The report shall be furnished to the General Contractor within 24 hours of the inspection as a part of the Excavation Subcontractor's daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

3.8.4 Monthly Inspection Report and Certification Form for Erosion and Sediment Controls

On the first working day of each month, the Excavation Subcontractor shall complete, sign, and submit a monthly Inspection Report and Certification Form for Erosion and Sediment Controls to the Engineer. The report shall include the inspection reports from Subsection 3.8.3 and include a description of the damage, corrective measures, and actions taken to the erosion and sediment control measures during the previous month.

END OF SECTION

SECTION 02371

EROSION CONTROL – SUPPORT AREAS, ACCESS ROADS, AND STAGING AREAS

PART 1 GENERAL

1.1 SCOPE

a. Furnish all labor, materials, tools and equipment, and perform all operations necessary for erosion control work indicated on the Drawings, as specified or as directed by the Government.

1.2 PROJECT CONDITIONS

a. Earthmoving activities shall be conducted in such a manner as to prevent accelerated erosion and the resulting sedimentation.

b. The Excavation Subcontractor shall design, implement, and maintain erosion and sedimentation control measures that effectively prevent accelerated erosion and sedimentation.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Out of River Erosion and Sedimentation Control Plan; G

a. The Government reserves the option to require that the General Contractor submit an erosion and sedimentation control plan for staging and support areas, prepared by a person trained and experienced in erosion and sedimentation control methods and techniques, to the Government for approval. The absence of the Government's requirement for submittal of an erosion and sedimentation control plan shall not be interpreted as a dismissal of the other conditions and requirements of this section.

1.4 GENERAL METHODOLOGY

a. Erosion and sedimentation control methods shall consider all factors that contribute to erosion and sedimentation including, but not limited to, the following:

1. Topographic features of the Project area.

2. Types, depth, slope, and areal extent of the soils.

3. Proposed alteration of the area.

4. Amount of runoff from the Project area and the upstream watershed area.

5. Staging of earthmoving activities.

6. Temporary control measures and facilities for use during earthmoving and soil handling and stockpiling.

7. Permanent control measures and facilities for long-term protection.

8. Maintenance program for the staging and support areas, including disposal of materials removed from the staging areas or Project area.

PART 2 PRODUCTS

2.1 SEDIMENT BARRIERS

a. Sediment barriers shall be hay or straw bales, geotextile fabric, stone or other approved materials that will prevent sedimentation.

2.2 MULCH

a. Mulch shall be in accordance with the requirements of Table 02371-1 attached to this section.

PART 3 EXECUTION

3.1 DIVERSION TERRACES

a. Diversion terraces shall be used as a temporary measure installed on the uphill side of the disturbed areas to divert surface runoff away from unstabilized slopes, and the Project area.

b. Recommended Minimum Dimensions:

Height	1.5 feet
Top Width	2.0 feet
Side Slopes	2:1 or flatter
Material	Soil

3.2 INTERCEPTOR CHANNELS

a. Interceptor channels shall be used across disturbed areas where the slope is running parallel to the direction of trenches.

b. Interceptor channels reduce erosion by intercepting storm runoff and diverting it to outlets on the lower side of the disturbed area where it can be disposed of and result in minimum erosion impact.

c. Recommended Dimensions and Materials:

Depth	0.5 feet
Width	2.0 - 4.0 feet
Side Slopes	2:1 or flatter
Spacing	As required
Material	Stable on-site material

3.3 TRENCH BARRIERS

a. Trench barriers shall be used when the slope exceeds 15% or when the Government deems necessary.

b. Trench barriers shall be earth-filled sacks or piled stone, stacked to the top of the trench after installation of the sewer and prior to backfill, if backfill is delayed.

c. Trench barriers shall act as an erosion check by preventing the washout of the trench.

d. Recommended Dimensions and Materials:

Height	To top of trench
Spacing	Approximately every 150 feet

Material	Earth-filled sacks or piled stones

3.4 SEDIMENT BARRIERS

a. Sediment barriers shall be used at storm drain inlets; across minor swales and ditches; and at other applications where the structure is of a temporary nature and structural strength is not required. Sediment barriers are temporary berms, diversions, or other barriers that are constructed to retain sediment on-site by retarding and filtering storm runoff.

b. Recommended Materials and Dimensions

1. Stone:

Height	1.5 - 2.0 feet (uniform top elevation)
Top Width	3.0 - 5.0 feet
Side Slope	3:1 or flatter
Required Cross-Sectional Area	20 SF/Tributary Acre
Material	Coarse rock or stone

2. Geotextile Fabrics

a. Supported by stakes/posts as required and further supported by a netting of industrial polypropylene, if required.

b. Height: As required to restrain sediment.

c. Fabric: Mirafi 100 or equal.

d. Toe of fabric to be buried 6 inches in native soil.

3. Hay or Straw Bales:

a. Bales should be bound with twine.

b. Bales should be anchored to the ground with fence posts, wood pickets or any naturally decomposable material. Two anchors per bale are required.

c. Bales shall be installed so that runoff cannot escape freely under bales.

Height	1.5 feet
Width	1.5 - 3.0 feet

Cross Sectional Area 50 SF/Tributary Acre

3.5 TEMPORARY STREAM CROSSINGS

a. Temporary stream crossings shall be used at locations where construction equipment crosses a stream, allowing these vehicles to cross the stream with minimal disturbance of the stream bed. Temporary stream crossings shall consist of an embankment of rock, or soil with riprap, with a pipe or combination of pipes placed on the stream bed to minimize interruption of flow.

b. Recommended Dimensions and Materials:

Height	Greater than or equal to the stream banks
Side Slopes	2:1 or steeper
Material	Rock or compacted soil with rock rip-rapped.
Other	Installation of energy dissipaters at the outflow of the pipes to prevent erosion of stream bottom.

3.6 MULCH

a. Used alone or in conjunction with other structural or vegetative erosion control measure, mulch is applied on any disturbed area that is subject to erosion, for protection of disturbed soil or newly reseeded areas.

b. Recommended Methods and Materials:

Material	Hay, straw, woodchips.
Methods	Spread by hand tools on small plots and by mechanical blower on larger areas. Tacked by passing a tracked construction vehicle over the mulched area.
Rates	See Table 02371-1.

Table 02371-1

Mulch Materials, Rates, and Uses

Mulch Material	Quality Standards	Application Rates		Depth of Application	Remarks
		Per 1,000 sq. ft	Per acre		
Straw or Hay	Air-dried. Free of coarse materials	75-100 pounds 2-3 bales	1.5-2.5 tons 90-120 bales	Lightly cover 75 to 90% of surface	Use straw where mulch effect is to be maintained for more than 3 months. Subject to wind blowing unless kept moist or tied down. Most common and widely used mulching material. Good for erosion control in critical areas.
Wood Chips	Green or air-dried	500-900 pounds	10-20 tons	2 -7 inches	If intensive foot or vehicle traffic is anticipated, the application rate may be increased. Resistant to wind blowing. Decomposes slowly.

END OF SECTION

SECTION 02372

CONTINGENCY PLAN SPECIFICATION FOR MANAGING NAPL CONTAMINATION ENCOUNTERED DURING CONSTRUCTION ACTIVITIES

PART 1 GENERAL

The objectives of this contingency plan include identifying measures to be implemented in the event non-aqueous phase liquids (NAPL) are encountered during construction. Short-term measures are included to manage NAPL releases, limit further migration of NAPL, and to restore the work area to the extent practicable to allow the work to proceed.

1.1 REFERENCES

Physical Processes Affecting the Movement and Spreading of Oils in Inland Waters, R. Overstreet and J.A. Galt, NOAA / Hazardous Materials Response and Assessment Division, Seattle, Washington HAZMAT Report 95-7, September 1995, prepared for U.S. Environmental Protection Agency, Region V, Chicago, Illinois.

United States Coast Guard Incident Management Handbook, U.S. Coast Guard, COMTDPUB P3120.17.

Method for the Determination of Extractable Petroleum Hydrocarbons (EPH), FINAL Laboratory Standard Operating Procedure (SOP), January 1998, Massachusetts Department of Environmental Protection.

1.2 POTENTIAL AREAS OF CONCERN

The Excavation Subcontractor shall be prepared to manage NAPL wherever encountered. Areas of concern where NAPL may be encountered include the former oxbows along the river between the Lyman and Elm Street bridges. In this area, 52 borings were advanced approximately 10 feet below the river bottom at roughly 50-foot spacing. Information on these explorations and existing conditions available to the Excavation Subcontractor includes the following:

a. Final Engineering Evaluation/Cost Analysis for the Upper Reach of the Housatonic River. Roy F. Weston, Inc. July 2000. GEP4-071400-AACY.

b. Final Addendum to the Engineering Evaluation/Cost Analysis for the Upper Reach of the Housatonic River. Roy F. Weston, Inc. October 2000. GE-092800-AADP.

Based on existing sampling data, the potential areas of concern for NAPL deposits most likely include the riverbanks. However, based on previous remediation work upstream of the project site, the potential for NAPL deposits located beneath the sediments in the riverbed also exists.

Consistent with standards of practice for subsurface exploration programs, the information included in the EE/CA and EE/CA Addendum reports is not expected to comprehensively and completely identify all locations where NAPL or NAPL source areas may be encountered.

1.3 CRITERIA FOR NAPL IDENTIFICATION

NAPL will be identified on the basis of visual observation of free phase liquid, or associated with seepage in the work area. The General Contractor shall characterize the NAPL by collecting a sample of the material and submitting it to an analytical laboratory certified by the Massachusetts Department of Environmental Protection (MDEP) for PCB and SVOC analyses.

1.4 SUBMITTALS

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

NAPL Management Plan; G

a. Notification requirements.

b. Plan for isolating NAPL where encountered, including a list and details for equipment and materials planned for use, and details for installing and removing structural units to isolate and contain NAPL.

c. Minimize NAPL conveyed to treatment system.

d. On-site management of NAPL sediment and soils.

e. On-site management of collected NAPL, equipment, and materials.

1.5 DESCRIPTION OF WORK

1.5.1 NAPL Isolation and Limiting NAPL Releases

In general, sheet pile shall be used to isolate NAPL from the work area, allowing work within the larger containment cell to proceed to the extent practicable. A cell may be

divided into smaller cells to further isolate NAPL. For smaller releases of NAPL, sorbent materials and/or sandbags may be used to limit the release extent prior to excavation of NAPL-contaminated materials. The means and methods for NAPL management are subject to the approval of the Engineer. The primary objective of the work associated with NAPL management is to first limit the release of NAPL, and then to manage and isolate the NAPL release such that the work can proceed.

Sheet pile isolation units shall include all work required to furnish all materials, labor, and equipment for installation, dewatering, maintenance, use, and removal of the sheet pile. Dewatering may be necessary to remove accumulated water from within the sheet pile isolation units. Dewatering includes designing, furnishing, installing, operating, maintaining, and removing all necessary wells, well points, pumps, sumps, pipelines, filters, sedimentation basins, and other equipment of collection, removal, and disposal of surface water and groundwater within each containment cell as required to complete the work. Dewatering includes piping all removed water from the containment cells to the treatment system, after NAPL has been removed using absorbents, skimmers, etc.

No payment shall be made to the Excavation Subcontractor for delays or inconvenience, or any extra work, in the event the Excavation Subcontractor dewatering system does not work adequately or does not meet the specified requirements.

1.5.2 Related Labor, Equipment, and Materials

Labor, materials, and equipment such as skimmers, sorbents, sealants, and any other equipment and materials used by the Contractor to manage NAPL shall be provided in the NAPL Management Plan.

1.5.3 Excavation and Transport

The Excavation Subcontractor shall excavate NAPL-contaminated soil and sediment and carefully load the material into trucks for transport to the on-site stockpile area. The General Contractor will subsequently perform off-site transport and off-site disposal of excavated NAPL-contaminated soil and sediment.

PART 2 PRODUCTS

The Excavation Subcontractor shall maintain a sufficient supply of materials and equipment for NAPL management, including, but not limited to, sheet pile and associated connectors, sorbent materials of different types (e.g., pads, sheets, booms), piping, skimmers, and containment booms. A list of equipment and materials expected to be stored on-site shall be included in the NAPL Management Plan.

PART 3 EXECUTION

3.1 RESPONSIBILITIES

The Excavation Subcontractor is responsible for immediately reporting the observation of NAPL to the Engineer. The Excavation Subcontractor may then, subject to the approval of the Engineer, implement the NAPL Management Plan to isolate and contain NAPL. The Engineer and the Government will develop a long-term plan to incorporate NAPL remediation in the project.

3.2 NAPL ISOLATION AND CONTAINMENT

NAPL may be encountered in the riverbank subsurface and in the riverbed subsurface. In general, the observation of NAPL in these respective areas shall require isolation of the area using appropriate structural means to minimize migration of NAPL to other portions of the work area within the containment cell. Excavation beyond the limits shown on the Plans is likely to be required and is subject to the approval of the Engineer. Groundwater shall be removed from the excavation, after NAPL in the groundwater has been contained using sorbents, skimmers, or other methods, subject to the approval of the Engineer.

Visible NAPL shall be removed from the groundwater to the extent practicable before the groundwater is conveyed to the treatment system. Conveyance to the treatment system shall be in accord with Section 02464 METAL SHEET PILING with additional steps taken to minimize transport of NAPL to the treatment system.

3.3 EXCAVATION AND TRANSPORT OF NAPL-CONTAMINATED SOIL AND SEDIMENT

Excavation and transport shall include excavating and transport to the on-site stockpile area of materials determined unsuitable due to NAPL contamination after notification is provided to the Engineer by the Excavation Subcontractor. The Excavation Subcontractor shall not proceed with the excavation and transport of this material until the Engineer has classified the materials and has taken samples and field measurements as required. Failure on the part of the Excavation Subcontractor to uncover such material, notify the Engineer, and allow ample time for classification and measurement of such material will cause the forfeiture of the Excavation Subcontractor's right of claim to any classification or volume of material to be paid for other than that allowed by the Engineer for the areas of work in which such deposits occur.

3.4 ON-SITE MANAGEMENT OF NAPL-CONTAMINATED EQUIPMENT, MATERIALS, SEDIMENT, AND SOIL

NAPL-contaminated materials that will require management include equipment that contacts NAPL-contaminated sediment and soil, excavated sediment, excavated soil, materials used to absorb NAPL, and NAPL collected using mechanical means.

The Excavation Subcontractor will carefully load NAPL-contaminated materials and equipment into trucks for transport to the on-site stockpile area. Materials used to absorb NAPL and collected NAPL shall be placed in storage containers that are approved for use for containing liquid oily wastes and transported to the on-site stockpile area. The General Contractor will construct and maintain a separate NAPL-impacted soil and sediment stockpile area on the GE property. Off-site transport and disposal of NAPL-contaminated sediment and soil will be arranged by the General Contractor.

The Excavation Subcontractor shall clean the contaminated equipment in the on-site stockpile area. After inspection and approval by the Engineer, the equipment may be returned to the work area or stored temporarily on site.

3.5 STAND-BY TIME

When the work, including NAPL Management, cannot proceed because the presence of NAPL impedes the work, the Excavation Subcontractor shall notify the General Contractor. If the General Contractor and Government agree that the work cannot proceed, they will approve Stand-by status for the Excavation Subcontractor, to be paid on the basis of a change order provided by the Excavation Subcontractor. Stand-by status shall not apply when work can proceed in other areas within the Containment Cell and outside the NAPL-containment area, and/or in areas outside the Containment Cell.

END OF SECTION

SECTION 02450

CELLULAR CONFINEMENT SYSTEM

PART 1 GENERAL

Work covered by this section includes the supply and installation of a cellular confinement system to support restoration work within the Transition Area as shown on the drawings. The work consists of placing and securing a cellular confinement system on the restored slope and backfilling the cellular confinement system with topsoil. The Contractor shall review the drawings and specifications and shall provide a final design for the selected product(s) subject to review and approval of the Engineer as required herein.

1.1 REFERENCES

The publications listed as part of the manufacturer's quality control and installation requirements shall form a part of this specification to the extent referenced in the manufacturer's literature.

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Pre-Construction Submittals

Final Slope Protection Design

The final design shall at a minimum address the specific materials to be used including calculations showing the calculated factor-of-safety against sliding and other potential failure mechanisms particular to the selected material. The design shall address potential interface failure between the soil subbase and all geosynthetic materials installed as part of this Work. The method for anchoring the geocell, and the location and frequency of tendons and anchors shall be addressed as part of the design.

The final design shall also address the cutting of localized portions of the material to permit the installation of trees and shrubs.

SD-08 Manufacturer's Instructions

Manufacturer's Recommended Handling, Installation, and Repair Procedures

PART 2 PRODUCTS

2.1 GENERAL

All products and materials used as part of the slope protection system shall meet the requirements of the manufacturer's quality control program and shall satisfy the requirements of the Engineer-approved final design.

The cellular confinement system used for slope protection shall consist of perforated materials. The thickness of the material shall be at least 6 inches to facilitate placement of 6 inches of topsoil.

2.2 BACKFILL MATERIALS

Backfill materials shall be as specified in Section 02300 EARTHWORK or as required by the final design.

PART 3 EXECUTION

3.1 GENERAL

The cellular confinement system shall be installed on the prepared subgrade in accordance with the manufacturer's recommendations and as required by the Engineer-approved final design.

3.1.1 Backfilling

The cellular confinement system used for slope protection shall be backfilled with topsoil.

END OF SECTION

SECTION 02464

METAL SHEET PILING

PART 1 GENERAL

Work covered by this section includes furnishing, installing, and removing sheet pile as shown on the drawings to create a groundwater cut-off wall along the proposed diversion dam alignment. The cut-off wall shall be installed to minimize groundwater flow under and around the proposed diversion dam. Included in this work is the installation of driven H-piles to support the diversions dam walkway. The work shall include the installation of permanent sheet pile walls on the east (left) and west (right) river banks as shown on the Drawings. Installation of a permanent waling system is also included.

1.1 SUBMITTALS

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

A sheet pile installation plan detailing connections and sequence of work prior to the start of construction which addresses the installation and removal of temporary sheet pile and sheet pile associated with the diversion dam. This installation plan shall show the locations of Phase 1 Cells 11 and 12, the limits of the cell extensions, and the connects from the center line sheets to the diversion dam sheets. The plan shall also address methods of installing and removing sheet pile so as to prevent damage to completed construction, vibration monitoring, the cutting of sheet pile, and the type and use of temporary cofferdams. The plan shall address procedures to be implemented if obstructions are encountered prior to reaching the required termination depth.

A sheet pile installation plan detailing connections and sequence of work prior to the start of construction which addresses the installation of permanent sheet pile and waling system(s). The installation plan shall specifically address the method(s) to be utilized to prevent damage to previously completed work. The plan shall address methods to be implemented if obstructions are encountered. Special connectors and methods to cut sheet pile to length shall be presented.

SD-02 Shop Drawings

Metal Sheet Piling

Detail drawings for sheet piling including fabricated sections shall show complete piling dimensions, properties, details, driving sequence, and location of installed piling. Detail drawings shall include details and dimensions of templates and other temporary guide structures for installing piling.

SD-06 Test Reports

PCB wipe sample results for sheet piles which are removed.

SD-11 Closeout Submittal

As-Built Drawing showing horizontal alignment and top and tip elevations of groundwater cut-off wall.

As-Built Drawing showing horizontal alignment and top and tip elevations of permanent sheet pile wall.

1.2 SUBSURFACE DATA

Logs of test borings are included in the Pre-Design Summary for the 1.5-Mile Removal Action – Phase 2. The Excavation Subcontractor shall use this information at his sole risk. The available information on subsurface conditions applies only to the locations of the borings. The subsurface conditions elsewhere on the site or during construction may be different, and should be considered in the development of plans for constructing the groundwater cut-off wall.

1.3 DELIVERY, STORAGE AND HANDLING

Materials delivered to the site shall be undamaged and shall be stored and handled in the manner recommended by the manufacturer to prevent permanent deflection, distortion, or damage to the interlocks. Storage of sheet piling should also facilitate required inspection activities.

1.4 QUALITY ASSURANCE

All elements of the rigging equipment and system shall be in accordance with the general requirements of OSHA safety and health standards, health and safety requirements defined in this contract, and manufacturer's recommendations. All aspects of work shall comply with OSHA regulations regarding commercial driving as contained in CFR 29, Sections 1910.401 through 1910.441.

Where OSHA or other project standards conflict with the contract drawings or specifications, the more stringent standard applies.

1.5 INSTALLATION MONITORING AND INSPECTION

The Excavation Subcontractor shall document structure conditions and monitor vibrations as required in Section 01410. The Excavation Subcontractor shall also monitor vibrations on the concrete pile cap, H-piles, and soldier piles during all sheet pile installation activities.

1.6 USE OF WATER TREATMENT SYSTEM

All dewatering activities associated with the installation of the groundwater cut-off wall shall be in conformance with the requirements that have been established for Phase 1 construction.

PART 2 PRODUCTS

2.1 METAL SHEET PILING

The grade and type of metal sheet piling required are shown on the drawings. The interlocks of sheet piling shall be free-sliding, provide a swing angle suitable for the intended installation but not less than 5 degrees when interlocked, and maintain continuous interlocking when installed. Interlocks shall be hot-rolled. Standard measures shall be used to limit seepage through the interlocks. Sheet piling including special fabricated sections shall be full-length sections of the dimensions shown. Fabricated sections shall conform to the requirement and the piling manufacturer's recommendations for fabricated sections.

Fabricated sections connecting centerline sheet pile to the groundwater cut-off sheet pile composed of pilings from different manufacturers shall be "Y," "T," or "+" sections fabricated from the respective manufacturer's pilings. Fabricated tees, wyes, and cross pieces shall be fabricated of piling sections with a minimum web thickness of 1/2 inch. Sheet piling shall be provided with standard pulling holes. The use of used sheets is acceptable with prior approval of the Engineer. Splicing of sheets is acceptable for use in temporary applications only. The Excavation Subcontractor is solely responsible for all welded connections.

2.2 APPURTENANT METAL MATERIALS

Metal plates, shapes, bolts, nuts, rivets, and other appurtenant fabrication and installation materials shall conform to manufacturer's standards and to the requirements specified.

The Excavation Subcontractor shall fabricate a pile section consisting of a W18x76 wide flange beam as shown on the drawings. All connections shall be welded full length. This pile section shall replace the standard Z-section in the diversion dam.

2.3 DEWATERING SYSTEM

The dewatering system shall be as required for Phase 1 construction.

PART 3 EXECUTION

3.1 GROUNDWATER CUT-OFF WALL AND PERMANENT RETAINING WALLS INSTALLATION

The groundwater cut-off wall shall be installed concurrent with sheet pile for Phase 1 Cells 11 and 12 and adjusted (driven deeper or cut off) as needed as excavation of Cells 11 and 12 is completed. The cut-off wall sheet pile within the riverbed shall be installed in its entirety prior to constructing the concrete pile cap. The sheet pile shall be installed to the required tip and top elevations. If necessary, sheet piling shall be cut to achieve the required top elevation.

Location	**Top Elevation (feet)**	**Minimum Tip Elevation (feet)**
In-River	Varies - 968 to 973	946 (+/- 2)
Bank	Varies – 976 to ground surface	946 (+/-2)

Sheet pile installed at and beyond the top of bank shall be driven or cut flush with the ground surface.

A short line of sheet pile shall be installed at the top of both banks parallel to the cut-off wall sheet pile to support the proposed diversion dam walkway, as shown on the drawings.

The permanent sheet pile retaining walls shall be installed at the locations shown on the drawings. The top and tip elevations of the permanent sheet pile walls shall be as shown on the Drawings. In lieu of cutting sheet pile to achieve the required top elevation, sheets may be driver deeper.

3.1.1 Pile Driving Equipment

Pile driving equipment shall be selected by the Excavation Subcontractor as needed to complete the work.

3.1.2 Placing and Driving

The Excavation Subcontractor will determine locations of existing piping and manholes prior to installation of the containment cells. Existing structures shall be protected and the

Excavation Subcontractor shall repair any damage incurred during the work at no additional cost to the General Contractor.

3.1.2.1 Placing

Pilings shall be inspected before driving to identify defects that may prevent free sliding in interlocks. Pilings shall be carefully located as shown. Pilings shall be placed plumb and true to line. Temporary wales, templates, master pilings, current deflectors, or guide structures shall be provided as needed to facilitate pile placement and correct alignment. Pilings properly placed and driven shall be interlocked throughout their length with adjacent pilings to form a continuous diaphragm throughout the length or run of piling wall.

3.1.2.2 Driving

Prior to driving pilings in water, the length of each sheet pile shall be documented. If the pilings cannot be driven to the design top elevation, the actual top elevation, prior to cutting shall be determined and the tip elevation calculated. Driving of centerline sheets and end of cell sheets shall be as specified for Phase 1. That is, a horizontal line shall be painted on both sides of each piling at a fixed distance from the bottom so that it shall be visible above the water line after installation. This line shall indicate the profile of the bottom elevation of installed pilings, and potential problem areas can be identified by abrupt changes in its elevation.

If the Excavation Subcontractor determines that driving the pilings to the specified embedment depth is not possible due to subsurface conditions that include frequent obstructions or high bedrock, the Excavation Subcontractor will note the embedment depth achieved. The Excavation Contractor shall try to remove obstructions using a spud or heavier driving sheet. If the obstructions cannot be penetrated, the Excavation Contractor shall adjust the alignment of the sheet pile in order to avoid the obstruction. If this is unsuccessful, and the obstruction is at a shallow depth, the obstruction may be removed by excavating the fill materials. The Engineer must approve all excavation of obstructions prior to initiating work. Excavation of material to remove obstructions shall be in accordance with Section 02111. Due to the high potential of encountering obstructions, the use of steel tips is encouraged.

If diversion dam cut-off sheet pile cannot be driven to the design elevation, the Excavation Subcontractor shall employ methods described above to penetrate or remove obstructions. If obstructions cannot be penetrated or removed, the Excavation Subcontractor may cut the sheet pile to achieve the required top elevation with prior approval from the Engineer. Alternately, the individual sheet pile may be removed, cut to the required length, and reinstalled. The Excavation Subcontractor must notify the Engineer prior to any such actions. Zero stickup is required on the active (flow) side of the centerline sheet pile wall, i.e., the top elevation of the diversion dam cut-off wall shall not protrude above the riverbed in the temporary condition. Sheet pile driven directly beneath the dam must be installed on line. No deviation in alignment is permitted.

If sheet pile installed as part of the permanent west bank retaining wall cannot be driven to the required embedment depth, the Excavation Subcontractor shall construct a reinforced concrete retaining block on the riverbed as shown on the Drawings to retain the toe of the sheet pile.

Sheet piles shall not be driven (or removed) within 50 feet of concrete less than 7 days old.

3.1.2.3 Cutting

The Excavation Subcontractor shall supply all labor and equipment necessary to cut sheet pile to the required configuration. Equipment shall include temporary water diversion structures as necessary.

3.1.3 Splicing of Temporary Sheet Piling

If directed, pilings shall be spliced as required to drive them to depths greater than shown and extend them up to the required top of sheet pile design elevation.

3.1.4 Inspection of Driven Piling

The Excavation Subcontractor shall inspect the interlocked joints of driven pilings extending above ground. Pilings that do not interlock shall be repaired subject to the approval of the Engineer.

3.2 MONITORING

The Excavation Subcontractor shall monitor vibrations on the concrete pile cap or H-piles/columns during all pile driving operations associated with dam installation. If the peak particle velocity at this location exceeds 2 inches per second, operations shall be terminated immediately and actions taken to ensure the peak particle velocity remains below the required value. Monitoring shall be initiated when operations are within 25 feet of the pile cap.

Vibration monitoring of structures immediately adjacent to all sheet pile driving operations shall be implemented by the Excavator Subcontractor. If the peak particle velocity at any monitoring point exceeds 2 inches per second, operations shall be terminated immediately and actions taken to ensure the peak particle velocity remains below the required value.

3.3 PULLING SHEET PILINGS

Pulling the sheet pilings shall conform to the following general guidelines:

a. Pile pulling equipment shall be selected by the Excavation Subcontractor as needed to complete the work. Pulling equipment shall be selected so as to minimize vibrations

and to avoid damaging completed construction. Any damage to the completed construction shall be repaired by the Excavation Subcontractor.

3.4 REMOVAL AND DECONTAMINATION/REUSE OF SHEET PILINGS

Removal of the sheet pilings shall conform to the following general guidelines:

a. Only pilings installed as part of the diversion dam shall be removed. That portion of the diversion dam cut-off wall that does not support the concrete pile cap shall be removed. Sheet concrete pile that supports the concrete pile cap may remain in place providing it does not protrude above the final design elevations of the riverbed and riverbanks. The pile cap shall be removed to the final design elevations where necessary.

b. Centerline piles shall be removed to within at least 5 feet of the diversion dam at the completion of construction.

c. Pile pulling equipment shall be selected by the Excavation Subcontractor as needed to complete the work.

d. The Excavation Subcontractor shall provide the necessary temporary water diversion structures required to facilitate the final removal of the diversion dam structure (walkway, support piles, framing, etc.).

e. Pilings shall be removed from the riverbanks only after the stop log dam has been removed.

   At the end of the project and prior to being taken off site, the sheet piles shall be removed, transported (by the Excavation Subcontractor) to a decontamination area approved by the General Contractor, and pressure-washed by the Excavation Subcontractor subject to the approval of the Engineer. Wipe testing of the sheets for PCBs will be conducted as described in Section 02111 HANDLING OF EXCAVATED MATERIAL AND BACKFILLING by the General Contractor, and testing results documenting compliance with the established PCB standard will be provided to the Government by the General Contractor.

f. Vibration monitoring shall be initiated as part of sheet pile removal activities.

END OF SECTION

SECTION 02930

BANK REVEGETATION
TRANSITION AREA

PART 1 GENERAL

1.1 DESCRIPTION

This Section includes specifications for restoring the riverbank vegetation at the Project Site subsequent to excavation, including those portions of the bank extending from the upper limit of hard structures (e.g., rock armor) to the top of the riverbank (limit of excavation). Bank restoration methods include using a hard structure riverbank toe (rock armor or rock armor with a retaining wall) with revegetation treatments occurring upslope to the top of the riverbank. As noted on the Project Drawings, some riverbanks will also utilize mechanically stabilized earth retaining walls, which will receive revegetation treatments as well.

Revegetation treatments shall follow the completion of topsoiling and final bank grading and shall include seeding; installation of erosion control blankets; and planting of trees, shrubs, and woody vines. Specific areas to receive revegetation treatments are indicated on the Project Drawings. This work shall include furnishing all necessary Submittals for plants, seeds, erosion control blankets, materials, equipment, and labor, as well as the care and replacement of plants and seeded areas during the Plant Establishment Period, all in accordance with the plans and specifications and the directions of the Engineer.

All work required in this Specification will be performed by the Planting Subcontractor except for work related to erosion control blankets and seeding, which will be performed by the Excavation Subcontractor. Additional requirements for erosion control blankets are specified in Section 02370 – STORM WATER AND EROSION CONTROL: IN-RIVER WORK.

1.2 SUBMITTALS

Government approval is required for submittals with a “G” designation; submittals not having a “G” designation are for information only. When used, a designation following the “G” designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 – SUBMITTAL PROCEDURES:

SD-01 Pre-Construction Submittals

Statement of qualifications (resume) of the restoration specialist overseeing the riverbank planting work; G.

SD-03 Product Data

Equipment

A listing of equipment to be used for the revegetation operations.

Delivery

Delivery schedules.

Plant Establishment Period

Calendar time period for the plant establishment periods. When there is more than one establishment period, the boundaries of the planted areas covered for each period shall be described.

Maintenance Record

Maintenance work performed, locations and quantities of plant losses and replacements, and diagnosis of unhealthy plant material.

SD-07 Certificates; G

Plant Material
Seed Mix
Erosion Control Blankets
Fertilizer
Compost

Prior to delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include:

a. Plant Material: Classification, botanical name, common name, stock type, size, quantity by species, date harvested, and location where grown.

b. Seed Mix: Species list with botanical name, common name, and percent by weight of each species in the mix.

c. Erosion Control Blankets: Technical specifications and product performance data.

d. Fertilizer: Chemical analysis and composition percent.

e. Compost: Specifications on source of compost, maximum particle size, pH, percent organic matter, conductivity, and total nitrogen content. Document compost compliance with EPA Chapter 40 CFR Part 503.

SD-10 Operation and Maintenance Data

Maintenance Instructions

Instruction for year-round care of installed plant material.

SD-11 Closeout Submittals

Planting Record Drawings; G

Scale drawings indicating the recorded number and locations of each plant installed and the areas seeded. Also, in red line on a print of the Project Drawings, record any changes made to the planting layout during installation.

1.3 SOURCE INSPECTIONS

The nursery or source of plant materials and the source of delivered topsoil and compost shall be subject to inspection.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery of plants, seed, and erosion control blankets. A delivery schedule shall be provided for each batch of materials if phased construction and planting occur.

1.4.1.1 Plant and Seed Identification

Plant material shall be identified with attached, durable, waterproof labels and weather-resistant ink, stating the botanical (i.e., Latin) plant name and size. Seed mixes shall be clearly marked to identify the contents of the mix in regard to species (botanical names), percent by weight of each species in the mix, and place of origin (i.e., state) of each species.

1.4.1.2 Protection During Delivery

Plant material shall be protected during delivery to prevent desiccation, heat stress, and damage to the branches, trunk, bark, root system, or earth ball. Branches shall be protected by tying-in. Exposed branches shall be covered during transport. Seed shall be protected during delivery to prevent wetting, water damage, or exposure to high temperatures ($> 90^{o}F$).

1.4.1.3 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical, physical, and/or biological analyses. In lieu of containers, soil amendments may be furnished in bulk. The specifications listed in Subsection 1.2 shall be provided for bulk deliveries. For the purpose of this specification, soil amendments shall include fertilizer, lime, microbial inoculants, and compost. Natural peat products will not be accepted as a soil amendment.

1.4.2 Inspection

Plant materials shall be inspected upon delivery and checked for species, size, quantities, and unauthorized substitution and to establish nursery-grown status or harvesting location. Plant material showing desiccation, abrasion, sun-scald injury, disease, disfigurement, or unauthorized substitution shall be rejected.

Plant material shall be well-shaped; vigorous and healthy with a healthy, well-branched root system; and free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement or abrasion. Plant material shall exhibit typical form of branch to height ratio and shall meet the caliper or height measurements specified. Plant material that measures less than specified, or has been poled, topped off or headed back, shall be rejected. Plant material shall show new fibrous roots, and the root mass shall contain its shape when removed from the container. Plant material with broken or cracked balls, or broken containers, shall be rejected.

1.4.3 Storage

1.4.3.1 Plant Material Storage

Plant material not installed on the day of arrival at the site shall be stored and protected in designated areas. Plant material shall not be stored longer than 30 days and shall be watered as necessary to promote survival during the storage period. All plant material shall be protected from direct exposure to wind and sun.

1.4.3.2 Other Material Storage

Storage of other material shall be in designated areas. Seed, soil amendments, and erosion control blankets shall be stored in dry locations, out of the sun and away from contaminants.

1.4.4 Handling

Plant material shall not be injured in handling. Containerized plant material shall not be handled by the trunk or stems. Materials shall not be dropped from vehicles or otherwise mishandled.

1.4.5 Replacements

In the event of damage or rejection, repairs or replacements shall be made.

1.4.6 Time Limitations

The time limitation between shipping and installing of plants shall not be more than 30 days.

1.5 WARRANTY

Each responsible Planting Subcontractor shall warrantee installed plant materials and seeded areas against defects, including death, disease, unsatisfactory growth or coverage; herbivory damage; settling of soils that adversely affects grading and site stability; and dislodgement or failure of erosion control blankets, except for defects resulting from abuse or damage by others or unusual phenomenon such as floods greater than a 50-year event.

Plants and seeded areas shall be warranteed to be in a healthy and vigorously growing condition for the calendar time period specified in PLANT ESTABLISHMENT PERIOD (Subsection 3.5). The warranty period shall coincide with the Plant Establishment Period, and shall commence at the completion of each planting phase, seeding phase, or bank restoration section. During the warranty period, the Planting Subcontractor shall replace dead, dying, or unhealthy installed plant material as directed by the Engineer. When such plant material is determined to be dead or unhealthy in accordance with paragraphs PLANT MATERIAL and PLANT ESTABLISHMENT PERIOD, it shall be replaced one or more times under this warranty.

PART 2 PRODUCTS

2.1 PLANT MATERIAL

2.1.1 Plant Material Classification

All tree, shrub, and vine plants shall be derived from stock native to the Northeast (i.e., New England and New York) and shall consist of nursery-grown stock obtained from Northeast nurseries. Seed mixes shall be derived from stock native to New England, New York, New Jersey, or Pennsylvania.

All plant material shall be the species specified. Botanical and common names of supplied plants shall conform to *The Vascular Plants of Massachusetts: A County Checklist*[1].

2.1.2 Plant Species

Table 1 contains a list of the tree, shrub, and vine species to be installed where plant material is specified. Each of the indicated species is native to the Project Area/region. The species listed shall be installed in the various flood stage or elevation zones of the revegetation areas as specified in Table 1. For a given bank revegetation planting area, approximately 75% of the tree species planted shall be primary species and 25% shall be associate species. Shrub species shall be equally distributed and planted in clumps, except for red-osier dogwood, which shall be planted in a band just upslope of the riverbank armor. Planting details are further described in the Project Drawings.

Table 1. Tree, shrub, and vine species to be used for plantings.

Elevation Zones	Trees	Shrubs	Vines
Bank Armor	No Tree Plantings	No Shrub Plantings	No Vine Plantings
Lower Bank (974'-978')	Primary: Black willow (*Salix nigra*) and silver maple (*Acer saccharinum*). Associates: Eastern cottonwood (*Populus deltoids*) and box elder (*Acer negundo*).	Band: Red-osier dogwood (*Cornus sericea*). Clumps: Silky dogwood (*Cornus amomum*), northern arrowwood (*Viburnum dentatum*), choke cherry (*Prunus virginiana*), and winterberry holly (*Ilex verticillata*).	River grape (*Vitis riparia*)
Upper Bank (978' to Top)	Primary: Eastern cottonwood and box elder. Associates: Black willow and silver maple.	Clumps: Northern arrowwood, winterberry holly, silky dogwood, and choke cherry	River grape

2.1.3 Types, Sizes, and Planting Distribution

Table 2 provides details on the plant sizes and installation densities and distribution for the bank revegetation areas. Planting distributions are further detailed on the Project Drawings.

[1] Sorrie, B. and P. Somers. 1999. The Vascular Plants of Massachusetts: A County Checklist. Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program, Westborough, MA 01581.

Table 2. Types, sizes, installation densities, and distribution for plantings installed in bank revegetation areas.

Specification	Trees	Shrubs	Vines
Plant Type	Container-Grown (1-gal pot minimum)	Container-Grown (1-gal pot minimum)	Container-Grown (1/2-gal pot minimum)
Size at Planting	4 to 6 feet in height	2 to 3 feet in height	Plant at least 2 years old
Planting Distribution	Unevenly-spaced rows parallel to river, with plants placed approximately 8 feet on center.	All shrubs except red-osier dogwood shall be installed in unevenly-spaced rows within 15-feet x 60-feet oblong clumps. Shrubs within clumps are to be spaced on 4-foot centers. Clumps spaced 40 feet apart (minimum). Red-osier dogwoods shall be installed in the lower bank area near the top of the rock armor. Dogwoods shall be spaced 6-feet on center.	On 8-foot centers within 15-feet x 30-feet oblong clumps that are spaced approximately 150 feet apart (minimum).
Overall Planting Density	700 plants per acre	730 plants per acre	40 plants per acre

2.1.4 Plant Schedule

The plant schedule shall provide botanical (i.e., Latin) names, common names (if available), classification, height/size, method of handling or shipping, and special characteristics as applicable. Botanical and common names shall conform to *The Vascular Plants of Massachusetts: A County Checklist.*

2.1.5 Substitutions

Substitutions will not be permitted without prior written request and approval from the Engineer.

2.1.6 Quality

Well-shaped, well-grown, vigorous plant material having healthy and well-branched root systems shall be provided. Plant material shall be provided free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement, and abrasion. Plant material shall be free of shock or damage to branches, trunk, or root systems, which may occur from the digging and preparation for shipment, method of shipment, or shipment. Rejected plants may not be used on the Project, will not be paid for, and shall be replaced with approved plants. Plants with communicable diseases shall be removed from the Project area immediately upon discovery of disease. Plants in contact with diseased plants will also be rejected.

2.1.7 Growing Conditions

Plant material shall be well-adapted to the growing conditions of the Project area. Plant material shall be grown under climatic conditions similar to those at the Project area.

2.1.8 Shipment and Handling

Plant material shall be grown in a container over a duration sufficient for new fibrous roots to have developed, and for the root mass to retain its shape and hold together when removed from the container. The container shall be sufficiently rigid to protect root mass during shipping. Plants shall be handled carefully to protect leaves, stems, branches, bark, and roots, and shall be protected from wind and sunlight during shipment.

2.1.9 Growth Form

2.1.9.1 Deciduous Trees

Height of branching shall bear a relationship to the size and species of tree specified, with the crown in good balance with the trunk. The trees shall not be "poled" or the leader removed.

a. Single stem: The trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.

b. Multi-stem: All countable stems, in aggregate, shall average the size specified. To be considered a stem, there shall be no division of the trunk that branches more than 6 inches from ground level.

c. Specimen: The tree provided shall be well branched and pruned naturally according to the species. The form of growth desired, which may not be in accordance with natural growth habit, shall be as indicated.

2.1.9.2 Deciduous Shrubs

Acceptable plant material shall be well shaped, with sufficient well-spaced side branches, and recognized by the trade as typical for the species grown in the region of the Project.

2.1.9.3 Vines

Acceptable vine plants shall have well-developed and balanced crowns with vigorous, well-developed root systems, and shall be furnished in containers.

2.1.10 Plant Material Size

Plant material shall be furnished in sizes indicated. Plant material larger in size than specified may be substituted with approval from the Engineer.

2.2 TREE PROTECTORS

Tree protectors shall be installed on each tree to reduce or eliminate damage from herbivores and other physical damage. Tree protectors shall be galvanized welded wire (19-gauge minimum) that can be wrapped around the tree stem and last for at least 5 years. Protectors shall be 36 inches tall to offer adequate protection for the size of the tree being planted and have a mesh size of ½ to 1 inch. The tree protector shall be installed 3 to 4 inches from the stem to prevent constriction and bark damage and to allow for proper air circulation. As shown on the Project Drawings, a stem protector shall be used with each installed tree protector to prevent scraping of bark against the tree protector during wind-caused movement. Metal staples (8-inch minimum) shall be used to secure the tree protector to the riverbank.

2.3 SEED

2.3.1 Seed Classification

Seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material.

2.3.2 Seed Mixture

The seed mixture for permanent seeding of the bank revegetation areas shall be proportioned by weight as follows:

Botanical Name	Common Name	Percent by Weight
Elymus riparius	stream bank wild rye	25
Elymus canadensis	Canada wild rye	15
Panicum clandestinum	deer-tongue	15
Poa palustris	fowl bluegrass	10
Agrostis stolonifera	creeping bentgrass	10

Desmodium canadense	showy tick-trefoil	5
Polygonum pensylvanicum	Pennsylvania smartweed	5
Asclepias syriaca	common milkweed	2
Rubus allegheniensis	common blackberry	2
Solidago canadensis	Canada goldenrod	2
Solidago gigantea	smooth goldenrod	2
Solidago rugosa var. *rugosa*	wrinkled goldenrod	2
Aster puniceus	bristly aster	2
Aster lateriflorus	calico or golden aster	1
Aster macrophyllus	big-leaved aster	1
Verbena hastata	blue vervain	1
		100

2.4 SOIL AMENDMENTS

2.4.1 Fertilizer

The nutrient ratio of fertilizer applied to the installed plants shall be as recommended by a soil test at the time of planting. Fertilizer shall be controlled release long-term commercial grade (3- to 4-month minimum), tablet or stake form, uniform in composition, and consist of a nitrogen-phosphorus-potassium ratio suitable for the plant material being installed.

The nutrient ratio of fertilizer applied to the seeded areas shall be determined based upon results of a soil test at the time of seeding. The soil test will be performed as part of this task. Fertilizer shall be a slow-release commercial grade, uniform in composition, and consist of a nitrogen-phosphorus-potassium ratio. The use, type, amount, and application of fertilizer shall be carefully considered due to the proximity to the river. It should be used only if the topsoil's nutrient content is clearly deficient, as determined from the previously specified soil test prior to the topsoil being spread.

2.4.2 Compost

Compost shall be free of weed seeds and comply with EPA Chapter 40 CFR Part 503 (e.g., pathogens, metals). The compost shall have a loose and granular texture with the following characteristics or properties: 30 to 60% organic matter content, 0.5 to 2.0% total nitrogen

content, 6.5 to 7.5 pH, maximum particle size less than 1 inch, and a conductivity of less than 5 mhos/cm.

2.5 MULCH

All installed plants shall be mulched at the time of installation using bark mulch as approved by the Engineer. Plants shall be installed through the erosion control blanket in a manner that allows the blanket to be used to cover the mulch after the mulch has been applied. Bark mulch will be applied at a uniform thickness of 2 to 3 inches around the base of each plant starting from the plant's drip line to within 2 inches of the plant's stem. Mulch shall be maintained through the Plant Establishment Period.

2.6 WATER

Unless otherwise directed, water shall be the responsibility of the Planting Subcontractor. The source of water shall be the Housatonic River adjacent to the specific planting area(s) being watered. Any coordination (e.g., permits) required for the removal of water from the Housatonic River will be the responsibility of the Planting Subcontractor.

2.7 EROSION CONTROL BLANKETS

2.7.1 Erosion Control Blanket Material

Following final grading and seeding, extended-use erosion control blankets shall be installed in the bank revegetation areas to protect the soil surface from erosion and scour. The purpose of the erosion control blanket specified herein is to provide long-term (as opposed to temporary) soil stabilization.

The product specifications shall be as follows:

Product	Specification
Fiber Type	High quality mattress-grade coir
Functional Longevity	2 to 3 years in place
Blanket Type	Stitched and netted
Stitching	Stitched at 2.0-inch centers
Stitching Material	Strong, biodegradable filament
Width of Roll	Minimum 7.5 feet
Length of Roll	Minimum 60 feet
Top Netting Type	Natural, biodegradable, 0.5- x 0.5-inch mesh
Bottom Netting Type	Natural, biodegradable, 0.5- x 0.5-inch mesh
Recommended Slope	1H:1V or steeper
D3776 Mass/Unit Area Minimum	10.0 oz/sy
D1777 Minimum Thickness	0.35 inches

D4595 Minimum Tensile Strength	220 x 140 lbs/ft
D4595 Maximum Elongation	34% x 20%
D4491 Flow Velocities, Short Term	10 ft./sec (minimum)
Maximum Permissible Shear Stress	2.0 lbs/sq. ft. (minimum)

2.7.2 Blanket Anchors

Ground anchors used to secure extended-use erosion control blankets shall consist of biodegradable stakes with a minimum length of 5 inches. Stakes shall be made of starch- or corn-based material with added polymers for strength and shall be designed to last a minimum of 9 months before degrading. The shaft of the stake shall have a minimum diameter of ¾-inch and shall have serrations for holding it securely in the soil. The top of the stake shall have a hook or a head large enough to effectively secure the blanket's netting to the soil surface.

2.8 PESTICIDE

The use of pesticides shall be prohibited during the Construction and Plant Establishment Periods covered under this specification. For the purpose of this specification, pesticide is defined as insecticide, herbicide, fungicide, nematocide, rodenticide, miticide, or soil fumigant. The prohibition of pesticide use during the Construction and Plant Establishment Periods shall not preclude the use of herbicides for control of invasive species during the Long-Term Maintenance Period.

PART 3 EXECUTION

3.1 GENERAL

Planting operations shall be performed in accordance with the specifications and Project Drawings and as directed by the Engineer. The Planting Subcontractor shall be responsible for the performance and completion of the work and shall retain a foreman experienced in the specified work at the site at all times when the work is in progress. In addition, the Planting Subcontractor shall provide a sufficient number of experienced and capable persons to carry out the work effectively and efficiently. In addition to the foreman, the Planting Subcontractor shall have on the job a sufficient number of persons experienced in plant identification, handling and installation of plants, and other tasks required to perform the work as specified herein.

3.2 BANK REVEGETATION

Bank revegetation measures shall take place in areas where the bank stabilization type is designated as "Revegetation" on the Project Drawings. The revegetation measures specified herein are to commence after finish grading of the topsoil and shall include seeding,

installation of erosion control blankets, plant installation, and plant and seeding maintenance during the Plant Establishment Period.

3.2.1 Site Conditions

Prior to planting, the Planting Subcontractor shall examine the subgrade and topsoil, observe the conditions under which the work is to be performed, and notify the Engineer of unsatisfactory conditions. Planting work shall not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer. Commencement of work shall signify the Planting Subcontractor's acceptance of site conditions as satisfactory.

3.2.2 Seeding and Planting Time Periods

Seeding of revegetation areas within completed bank sections shall take place directly after finish grading and prior to installation of erosion control blankets. Actual seeding time will, therefore, be dependent on the construction schedule, and seed may be spread during any time of the year.

Planting associated with bank revegetation shall be performed only during periods when beneficial results can be obtained, based on seasonal and climatic factors and plant species. When drought, excessive moisture, frozen ground, or other unsatisfactory conditions prevail, the planting work shall be stopped as directed by the Engineer. When special conditions warrant a variance to the planting or seeding operations, proposed revised planting/seeding times shall be submitted in writing to the Engineer for approval prior to implementation. Seasons for planting, unless otherwise directed, shall be within the following dates:

- Spring—April 1 to June 1
- Fall—September 1 to November 15

3.2.3 Seeding

Prior to installing seed, any previously-prepared surface shall be reworked to meet the finish grade, topsoil, and fertilizer requirements. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution. To prevent excessive runoff of fertilizer into the river, fertilizer shall not be spread during late fall or winter when the ground is frozen.

3.2.3.1 Seeding Method

The seeding method shall be broadcast seeding. Seed shall be uniformly broadcast at a rate of 1-lb/1,000 square feet of surface area, or as directed by the Engineer at the time of seeding. Half the total rate of seed application shall be broadcast in one direction, with the remainder of the seed rate broadcast at 90 degrees from the first direction. Broadcast seed shall be raked lightly to provide proper contact with the soil. After seed is broadcast, the seeded area shall

be covered with erosion control blanket as specified in the Project Drawings and outlined in Subsection 3.2.4.

3.2.3.2 Watering

When seed is applied during the growing season, watering shall start immediately after the seeded areas are covered with erosion control blankets. Then, for the remainder of the growing season, water shall be applied to supplement natural rainfall at a rate sufficient to ensure moist soil conditions and vigorous root growth and development (approximately 1 inch of water per week). Erosion, excessive runoff, and puddling shall be prevented during supplemental watering.

When seed is applied during the winter or dormant seasons, the seeded areas shall not be watered until the growing season starts, at which time water shall be applied to supplement natural rainfall as described above.

3.2.4 Installation of Erosion Control Blankets

Extended-use erosion control blankets shall be installed on the bank revegetation areas immediately following finish grading and seeding, but before planting. The type of erosion control blanket shall be as specified in Subsection 2.7, and it shall be installed as indicated on the Project Drawings. All seed shall be sown prior to installation of erosion control blankets.

3.2.5 Installation of Plants

3.2.5.1 Underground Utilities

The Planting Subcontractor shall verify the location of underground utilities and facilities in the area of the planting operation with the Engineer. Damage to underground utilities and facilities caused by the Planting Subcontractor shall be repaired by the Planting Subcontractor.

3.2.5.2 Layout

Plant material locations shall be marked with stakes or pin flags before any plant pits are excavated. Plant locations may be adjusted to meet field conditions at the direction or approval of the Engineer.

3.2.5.3 Protecting Existing Vegetation

When there are established lawns adjacent to the planting area, the turf shall be covered and/or protected during planting operations. Existing trees, shrubs, and plant beds that are to

be preserved shall be barricaded along the dripline to protect them during planting operations.

3.2.5.4 Obstructions Below Ground

When obstructions below ground affect the work, shop drawings showing proposed adjustments to plant material location, type of plant, and planting method shall be submitted for approval.

3.2.5.5 Plant Pits

Excavate plant pits as shown on the Project Drawings. Prior to excavating the pit, the erosion control blanket shall be carefully and cleanly cut in an "X" pattern and the flaps laid back in a manner to allow excavation of the pit and placement of the plant and to cover the mulch after plant installation is complete.

Plants installed in the Geoweb shall follow a similar process as above, except that portions of the Geoweb will need to be cut prior to plant installation. As shown on the Project Drawings, four adjacent cells shall be cut near the node and removed to accommodate the plant root mass and to reduce local soil compaction near the plant. An additional 8 to 10 inches of soil below the planting pit shall be lightly loosened prior to planting.

Geoweb cells surrounding individual planting areas shall not be cut or damaged during plant installation. Plants shall not be installed in areas where the Geoweb tendon is present.

3.2.5.6 Setting Plant Material

Plant material shall be set plumb and straight and held in position until sufficient backfill has been firmly placed around the root system or ball.

3.2.5.7 Fertilizing

The plants shall be fertilized at the time of planting, if necessary, based on the results of a soil test. The fertilizer shall be added at the time of planting to the upper 4 inches of the planting pit at the manufacturer's specified rate corresponding with the plant size and soil requirements as determined at the time of planting.

3.2.5.8 Backfill Soil Mixture

The backfill soil mixture may be topsoil or a mix of topsoil and compost suitable for the plant material specified. The backfill shall generally consist of the excavated soil from the plant pit, with amendments added as needed based on soil test results. Supplemental compost shall be added to plant pits within the Geoweb. The backfill material shall contain 25 to 30%

compost. Based on compost and topsoil analyses, soil amendments such as microbial inoculants can be added to improve local soil conditions.

3.2.5.9 Backfill Procedure

Prior to backfilling, plastic pots or containers shall be removed from the root system, avoiding damage to the root system. For plant material in biodegradable containers, the container shall be split prior to setting the plant with container. Prior to setting the plant in the pit, a maximum ¼-depth of the root mass, measured from the bottom, shall be spread apart to promote new root growth. Backfill mixture shall be added to the plant pit in 4- to 6-inch layers, with each layer tamped. The backfill soil mixture shall be carefully worked in amongst the roots. Air pockets shall be removed from around the root system, and root-to-soil contact shall be provided. Unless existing soil conditions are saturated, plant pits shall be watered until completely saturated immediately after backfilling.

3.2.5.10 Mulch

The installed plants shall be mulched after backfilling and watering have been completed. Bark mulch will be applied at a uniform thickness of 2 to 3 inches around the base of the plant within the zone from 2 to 12 inches around the plant's stem.

3.2.5.11 Adjusting Erosion Control Blanket

The erosion blanket shall be folded back over the mulch and stapled with 6-inch long staples (minimum) in a manner that prevents the mulch from being eroded during flood events. The intent is to allow the blanket and mulch to provide weed and soil moisture control to benefit the installed plant.

3.2.5.12 Herbivore Control

To protect trees from potential herbivore damage, tree tubes or similar protectors shall be installed on all trees after planting. The protectors shall extend from the base of the tree (i.e., at or just below the soil surface) up the stem to a height of 36 inches. The protector shall be wrapped around the tree and be spaced 3 to 4 inches from the stem to provide sufficient space for stem growth and allow for air circulation along the stem. As shown on the Project Drawings, stem protectors shall be installed on each tree protector to prevent scraping of bark against the tree protector. Metal or biodegradable staples (8-inch minimum) shall be used to secure the tree protector to the riverbank.

Tree protectors shall remain on the trees during the Plant Establishment Period and shall be left securely in place at the end of the Plant Establishment Period.

3.2.5.13 Pruning

Pruning shall be conducted only if directed by the Engineer and shall be accomplished by trained and experienced personnel. Only dead or broken material shall be pruned from installed plants. The typical growth habit of individual plant material shall be retained. Clean cuts shall be made flush with the parent trunk. Improper cuts, stubs, and dead or broken branches shall be removed. "Headback" cuts at right angles to the line of growth will not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off." Wound dressing or pruning paint shall not be applied.

3.3 MAINTENANCE DURING PLANTING OPERATION

Installed plant material shall be maintained in a healthy growing condition. Maintenance operations shall begin immediately after each plant is installed to prevent desiccation and shall continue until the Plant Establishment Period commences. The maintenance shall include watering, adjusting settled plants, pruning dead or broken branches, and adjusting tree protectors. Areas at the base of the installed plants shall be kept free of weeds, grass, and other undesired vegetation.

3.4 RESTORATION AND CLEAN UP

3.4.1 Restoration

Turf areas, pavements and facilities that have been damaged due to the planting operation shall be restored to original condition.

3.4.2 Clean Up

Excess and waste material, including empty plant containers and other unused items, shall be removed from the bank restoration and material storage areas and shall be disposed or recycled offsite. Adjacent paved areas shall be cleared.

3.5 PLANT ESTABLISHMENT PERIOD

3.5.1 Commencement

Upon completion of the last day of the planting operation for that planting or seeding phase, the Plant Establishment Period for maintaining installed plant material and seeded areas in a healthy growing condition shall commence, and shall be in effect for at least one full growing season (Spring planting shall last 16 months and fall planting shall last 12 months).

Immediately following the Plant Establishment Period, the growth and survival of the plants and seed will be monitored under a Long-Term Maintenance Period specification (not defined or included herein). Written calendar time period shall be furnished for the Plant Establishment Period(s). In the event that there is more than one Plant Establishment Period (due to a phased planting schedule), the boundaries of the planted and seeded area covered for each period shall be described and marked on a print of the Project Drawings and provided to the Engineer. The Plant Establishment Period shall be modified for inclement weather shut down periods or for separate completion dates for the individual planting areas or planting phases.

3.5.2 Maintenance During Plant Establishment Period

Maintenance of plant material shall include straightening plant material; protecting from girdling; adjusting erosion control blanket coverage at the base of plants; pruning dead or broken branches; maintaining plant material labels; watering; reseeding bare or sparsely-seeded areas; eradicating noxious weeds, insects, and disease; and removing and replacing unhealthy, diseased, or dead plants.

Seeded areas will be accepted only upon attainment of 100% coverage of a reasonably thick, uniform stand of the grasses and herbaceous plants from the specified seed mix and from non-invasive volunteer growth[2]. Coverage does not include the areas under trees and shrubs covered by mulch or those areas where hard structures are present (e.g., rock swales, outfalls).

3.5.2.1 Watering Plant Material

The plant material and seeded areas shall be watered as necessary to prevent desiccation and to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is estimated to be the equivalent of 1 inch of absorbed water per week, delivered by natural precipitation and augmented by watering, as required. Run-off, erosion, puddling, and wilting shall be prevented. Unless otherwise directed, watering trucks shall not be driven over turf areas. Watering of other adjacent areas or existing plant material shall be prevented.

3.5.2.2 Weeding

The areas at the base of the installed plants shall be kept substantially free of weeds and grass during the Plant Establishment Period to reduce competition for nutrients and water. Weeds and grass shall be completely removed, including the root systems.

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[2] Non-invasive plants are those not listed in Weatherbee, P.B., P. Somers, and T. Simmons. 1998. *A Guide to Invasive Plants in Massachusetts.* Massachusetts Division of Fisheries and Wildlife.

3.5.2.3 Plant Pit Settling

When settling occurs to the backfill soil mixture, additional backfill soil shall be added to the plant pit until the backfill level is equal to the surrounding grade, while keeping the base of the plant stem at the proper height above the ground surface. Serious settling that affects the setting of the plant in relation to the maximum depth at which it was grown shall require replanting in accordance with Subsection 3.2.5, Installation of Plants.

3.5.2.4 Maintenance Record

A record shall be furnished describing the maintenance work performed, locations of maintenance activity, the quantity of plant losses, diagnosis of individual plant losses, and the quantity of replacements made during each site visit.

3.5.2.5 Unhealthy Plant Material

A tree or shrub shall be considered unhealthy or dead when the main leader has died back or more than 50% of the crown has died. This condition shall be determined by scraping on a branch an area 1/16-inch square (maximum) to determine if there is a green cambium layer below the bark. A vine shall be considered unhealthy or dead when more than 50% of the stem length or 50% of the areal coverage of stems and foliage have died. The Planting Subcontractor shall determine the cause for unhealthy or dead plant material and shall provide recommendations for replacement. Unhealthy or dead plant material shall be removed immediately and shall be replaced as soon as seasonal conditions permit.

3.5.2.6 Replacement Plant Material

Unless otherwise directed, new plant material shall be provided for replacement of unhealthy or dead plants in accordance with Subsection 1.5 WARRANTY. Replacement plant material in the revegetation areas shall be installed in accordance with Subsection 3.2.5, Installation of Plants. An extended Plant Establishment Period shall not be required for replacement plant material unless the Engineer determines that more than 50% of the replacement plants have failed.

3.5.2.7 Maintenance Instructions

Written instructions shall be furnished to the Engineer, including drawings and other necessary information for year-round care of the installed plant material. Instructions shall include when and where maintenance should occur and the procedures for plant material replacement.

END OF SECTION

DIVISION 3—CONCRETE

SECTION 03100

STRUCTURAL CONCRETE FORMWORK

PART 1 GENERAL

Work covered by this section includes designing, furnishing, installing, and removing formwork for structural concrete.

1.1 REFERENCES

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

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 347R (1988) Guide to Formwork for Concrete

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4 (1982; R 1988) Basic Hardboard

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 578 (1992) Rigid, Cellular Polystyrene Thermal Insulation

DEPARTMENT OF COMMERCE (DOC)

DOC PS 1 (1983) Construction and Industrial Plywood

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

Design:

Design analysis and calculations for form design and methodology used in the design.

Concrete Formwork:

Manufacturer's data including literature describing form materials, accessories, and form releasing agents.

SD-02 Shop Drawings

Concrete Formwork:

Drawings showing details of formwork including dimensions of fiber voids, joints, supports, studding and shoring, and sequence of form and shoring removal.

SD-03 Product Data

Form Releasing Agents:

Manufacturer's recommendation on method and rate of application of form releasing agents.

1.3 DESIGN

Formwork shall be designed in accordance with methodology of ACI 347R for anticipated loads, lateral pressures, and stresses. Forms shall be capable of withstanding the pressures resulting from placement and vibration of concrete.

PART 2 PRODUCTS

2.1 FORM MATERIALS

All formed concrete surfaces shall be Class D finish. Forms for Class D finished surfaces, except where concrete is placed against earth, shall be wood or steel or other approved concrete form material.

2.2 FORM TIES

Form ties shall be factory-fabricated metal ties, shall be of the removable or internal disconnecting or snap-off type, and shall be of a design that will not permit form deflection and will not spall concrete upon removal. Solid backing shall be provided for each tie. Except where removable tie rods are used, ties shall not leave holes in the concrete surface less than 1/4 inch nor more than 1 inch deep and not more than 1 inch in diameter. Removable tie rods shall be not more than 1-1/2 inches in diameter.

2.3 FORM RELEASE AGENTS

Form releasing agents shall be commercial formulations that will not bond with, stain or adversely affect concrete surfaces. Agents shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds. Form releasing agents shall not adversely affect the color or texture of the textured concrete on the exposed face of the dam stem.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Formwork

Forms shall be mortar tight, properly aligned and adequately supported to produce concrete surfaces meeting the surface requirements specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. Where forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface so as to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be reused if there is any evidence of surface wear and tear or defects, which would impair the quality of the surface. Surfaces of forms to be reused shall be cleaned of mortar from previous concreting and of all other foreign material before reuse. Form ties that are to be completely withdrawn shall be coated with a nonstaining bond breaker.

3.2 COATING

Forms for Class D finished surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.3 REMOVAL OF FORMS

Forms shall be removed in a manner that will prevent injury to the concrete and ensure the complete safety of the structure. Formwork for columns, walls, side of beams and other parts not supporting the weight of concrete may be removed when the concrete has attained sufficient strength to resist damage from the removal operation but not before at least 24 hours has elapsed since concrete placement. Supporting forms and shores shall not be removed from beams, floors and walls until the structural units are strong enough to carry their own weight and any other construction or natural loads. In no case will supporting forms or shores be removed before the concrete strength has reached 70 percent of design strengths as determined by field cured cylinders or other approved methods. This strength shall be demonstrated by job-cured test specimens, and by a structural analysis considering the proposed loads in relation to these test strengths and the strength of forming and shoring system. The job-cured test specimens for form removal purposes shall be provided in numbers as directed and shall be in addition to those required for concrete quality control. The specimens shall be removed from molds at the age of 24 hours and shall receive, insofar as possible, the same curing and protection as the structures they represent.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

Work covered by this section includes designing, furnishing, installing, and removing formwork for structural concrete.

1.1 REFERENCES

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

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 318/318R	(1989; Rev 1992; Errata) Building Code Requirements for Reinforced Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 82	(1994) Steel Wire, Plain, for Concrete Reinforcement
ASTM A 184	(1990) Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 615	(1994) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4	(1992) Structural Welding Code - Reinforcing Steel

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI MSP-1	(1990) Manual of Standard Practice

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Concrete Reinforcement System:

Detail drawings showing reinforcing steel schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

SD-07 Certificates

Reinforcing Steel:

Certified copies of mill reports attesting that the reinforcing steel furnished meets the requirements specified, prior to the installation of reinforcing steel.

1.3 DELIVERY AND STORAGE

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 DOWELS

Dowels shall conform to ASTM A 615, Grade 60.

2.2 REINFORCING STEEL

Reinforcing steel shall be deformed bars conforming to ASTM A 615 or grade 60. Sizes shall be as shown on the contract drawings.

2.3 WIRE TIES

Wire ties shall be 16 gauge or heavier black annealed steel wire.

2.4 SUPPORTS

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI MSP-1 and shall be steel.

PART 3 EXECUTION

3.1 REINFORCEMENT

Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318/318R. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete.

Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms.

3.1.1 Placement

Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with 318/318R at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318/318R. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318/318R and shall be made only as required or indicated. Splicing shall be by lapping. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete.

3.2 DOWELS

Dowels shall be installed in the base as shown on the contract drawings. Dowels shall be accurately positioned and aligned parallel to the finished concrete surface before concrete placement. Dowels shall be rigidly supported during concrete placement.

END OF SECTION

SECTION 03250

EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS

PART 1 GENERAL

Work covered by this section includes activities to be conducted by the Excavation Subcontractor including designing, furnishing, and installing expansion joints, contraction joints and water tops.

1.1 REFERENCES

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

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1982; R 1988) Basic Hardboard

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 109	(1993) Steel, Strip, Carbon, Cold-Rolled
ASTM C 920	(1987) Elastomeric Joint Sealants
ASTM D 1190	(1974; R 1980) Concrete Joint Sealer, Hot-Poured Elastic Type
ASTM D 1191	(1984) Testing Concrete Joint Sealers
ASTM D 1751	(1983; R 1991) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
HYDROPHILIC	Adeka Utraseal MC-2010M Natural Rubber with Urethane Rubber Hydrophilic Agent in Polymerized Rubber
ASTM D 5249	(1992) Backer Material for Use With Cold and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints

CORPS OF ENGINEERS (COE)

COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstops

FEDERAL SPECIFICATIONS (FS)

FS TT-S-230	(1970) Sealing Compound: Elastomeric Type, Single Component (for Calking, Sealing, and Glazing in Buildings and Other Structures)

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Waterstops:

Shop drawings and fabrication drawings provided by the manufacturer or prepared by the Contractor for each type used.

SD-03 Product Data

Preformed Compressible Joint Filler; Sealant; and Waterstops:

Manufacturer's literature, including safety data sheets, for preformed fillers and the lubricants used in their installation; field-molded sealants and primers (when required by sealant manufacturer); preformed compression seals; and waterstops.

Preformed Compressible Joint Filler; Sealant; Waterstops:

Manufacturer's recommended instructions for installing preformed fillers, field-molded sealants; preformed compression seals; and waterstops; and for splicing non-metallic waterstops.

SD-04 Samples

PVC and Expanding Waterstops and Splices:

Specimens identified to indicate manufacturer, type of material, size, quantity of material, and shipment or lot represented. Each sample shall be a piece not less than 12 inch long from each type used. One splice sample of each size and type. The splice samples shall be made using straight run pieces with the splice located at the mid-length of the sample and finished as required for the installed waterstop. The total length of each splice shall be not less than 12 inches long.

SD-07 Certificates

Preformed Compressible Joint Filler; Sealant; Waterstops:

Certificates of compliance stating that the joint filler and sealant materials and waterstops conform to the requirements specified.

1.3 DELIVERY AND STORAGE

Material delivered and placed in storage shall be stored off the ground and protected from moisture, dirt, and other contaminants. Sealants shall be delivered in the manufacturer's original unopened containers. Sealants whose shelf life has expired shall be removed from the site.

PART 2 PRODUCTS

2.1 PREFORMED COMPRESSIBLE JOINT FILLER

Compressible joint filler shall be preformed material conforming to ASTM D 1751 or ASTM D 1752. Unless otherwise indicated, filler material shall be 3/4 inch thick and of a width applicable for the joint formed. Backer material, when required, shall conform to ASTM D 5249.

2.2 SEALANT

Joint sealant shall conform to the following:

2.2.1 Polyurethane Elastomeric Sealant

Polyurethane elastomeric sealant shall be a one-component, polyurethane base material applicable for use in horizontal, vertical, and overhead joints. Sealant shall cure under the influence of atmospheric moisture to form an elastomeric substance. Sealant color shall match that of the concrete surface.

2.3 PRIMER AND BACKER ROD

Primer and backer rod for elastomeric sealant shall be as shown or recommended by the sealant manufacturer.

2.4 WATERSTOPS

Intersection and change of direction waterstops shall be shop fabricated.

2.4.1 PVC Waterstops

PVC waterstops shall be manufactured from a prime virgin resin; the compound shall contain plasticizers, stabilizers, and other additives to meet specified requirements. Polyvinylchloride waterstops shall conform to COE CRD-C 572.

2.4.2 Expanding Waterstop

Expanding waterstop system shall consist of a hydro-active, expansive rubber by Adeka Ultraseal or approved equal.

PART 3 EXECUTION

3.1 JOINTS

Joints shall be installed at locations indicated and as shown on the contract drawings.

3.1.1 Expansion Joints

Preformed compressible joint filler shall be used in expansion joints as shown on the contract drawings. The filler strips shall be installed at the proper level beneath the finished surface with a slightly tapered, dressed and oiled wood strip temporarily secured to the top thereof to form a recess to the size shown on the drawings. The wood strip shall be removed after the concrete has set. Contractor may opt to use a removable expansion filler cap designed and fabricated for this purpose in lieu of the wood strip. The groove shall be thoroughly cleaned of laitance, curing compound, foreign materials, protrusions of hardened concrete, and any dust which shall be blown out of the groove with oil-free compressed air.

3.1.2 Joint Sealant

Construction joints and expansion joints shall be filled with elastomeric joint sealant and backer rod. Joint surfaces shall be clean, dry, and free of oil or other foreign material which would adversely affect the bond between sealant and concrete. Joint sealant shall be applied as recommended by the manufacturer of the sealant.

END OF SECTION

SECTION 03300

CAST-IN-PLACE STRUCTURAL CONCRETE

PART 1 GENERAL

Work covered by this section includes activities to be conducted by the Excavation Subcontractor including designing, furnishing, and installing cast-in-place concrete.

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991I) Burlap Cloth Made From Jute or Kenaf

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117/A117R	(1990; Errata) Standard Tolerances for Concrete Construction and Materials
ACI 211.1	(1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214.3R	(1988) Simplified Version of the Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 305R	(1991) Hot Weather Concreting
AC1306R	(1991) Cold Weather Concreting
ACI 318/318R	(1989; Rev 1992; Errata) Building Code Requirements for Reinforced Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 33	(1993) Concrete Aggregates
ASTM C 39	(1993a) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 94	(1994) Ready-Mixed Concrete

ASTM C 143	(1990a) Slump of Hydraulic Cement Concrete
ASTM C 150	(1994) Portland Cement
ASTM C 171	(1992) Sheet Materials for Curing Concrete
ASTM C 172	(1990) Sampling Freshly Mixed Concrete
ASTM C 231	(1991b) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(1994) Air-Entraining Admixtures for Concrete
ASTM C 494	(1992) Chemical Admixtures for Concrete
ASTM C 881	(1990) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 1017	(1992) Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1059	(1991) Latex Agents for Bonding Fresh to Hardened Concrete
ASTM D 1751	(1983; R 1991) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

CORPS OF ENGINEERS (COE)

COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstops

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA-01	(1992) Truck Mixer Agitator and Front Discharge Concrete Carrier Standards of the Truck Mixer Manufacturers Bureau

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-05 Design Data

Mixture Proportions:

The results of trial mixture design studies along with a statement giving the maximum nominal coarse aggregate size and the proportions of ingredients that will be used in the manufacture of concrete, at least 14 days prior to commencing concrete placing operations. Aggregate weights shall be based on the saturated surface dry condition. The statement shall be accompanied by test results from an approved independent commercial testing laboratory, showing that mixture design studies have been made with materials proposed for the project and that the proportions selected will produce concrete of the qualities indicated. No substitutions shall be made in the materials used in the mixture design studies without additional tests to show that the quality of the concrete is satisfactory.

SD-06 Test Reports

Testing and Inspection for Contractor Quality Control:

Certified copies of laboratory test reports, including mill tests and all other test data, for Portland cement, blended cement, pozzolan, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

1.3 GENERAL REQUIREMENTS

1.3.1 Tolerances

Except as otherwise specified herein, tolerances for concrete batching, mixture properties, and construction as well as definition of terms and application practices shall be in accordance with ACI 117/A117R. Level and grade tolerance measurements of slabs shall be made as soon as possible after finishing; when forms or shoring are used, the measurements shall be made prior to removal.

1.3.2 Strength Requirements and w/c Ratio

1.3.2.1 Strength Requirements

Specified compressive strength (f'c) for all concrete shall be 4,000 pounds per square inch (psi) at 28 days.

1.3.2.2 Water-Cement Ratio

Maximum water-cement ratio (w/c) for all concrete shall be 0.40 by weight.

1.3.3 Air Entrainment

All concrete shall be air entrained to contain between 4 and 7 percent total air, except that when the nominal maximum size coarse aggregate is 3/4 inch or smaller it shall be between 4.5 and 7.5 percent. Specified air content shall be attained at point of placement into the forms. Air content for normal weight concrete shall be determined in accordance with ASTM C 231.

1.3.4 Slump

Slump of the concrete, as delivered to the point of placement into the forms, shall be 1 to 4 inches. Slump shall be determined in accordance with ASTM C 143.

1.3.5 Concrete Temperature

The temperature of the concrete as delivered shall not exceed 90 degrees F. When the ambient temperature during placing is 40 degrees F or less, or is expected to be at any time within 6 hours after placing, the temperature of the concrete as delivered shall be between 55 and 75 degrees F.

1.3.6 Size of Coarse Aggregate

The largest feasible nominal maximum size aggregate (NMSA) specified in paragraph AGGREGATES shall be used in each placement. However, nominal maximum size of aggregate shall not exceed any of the following: three-fourths of the minimum cover for reinforcing bars, three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

1.3.7 Special Properties and Products

Concrete may contain admixtures other than air entraining agents, such as water reducers, superplasticizers, or set retarding agents to provide special properties to the concrete, if specified or approved. Any of these materials to be used on the project shall be used in the mix design studies.

1.4 MIXTURE PROPORTIONS

Concrete shall be composed of portland cement, other cementitious and pozzolanic materials as specified, aggregates, water and admixtures as specified.

1.4.1 Fresh Concrete

Fresh concrete will be sampled as delivered in accordance with ASTM C 172 and tested in accordance with these specifications, as considered necessary.

PART 2 PRODUCTS

2.1 CEMENTITIOUS MATERIALS

Cementitious Materials shall be portland cement or portland cement in combination with pozzolan and shall conform to appropriate specifications listed below. Use of cementitious materials in concrete which will have surfaces exposed in the completed structure shall be restricted so there is no change in color, source, or type of cementitious material.

2.1.1 Portland Cement

ASTM C 150, Type I with a maximum 15 percent amount of tricalcium aluminate, or Type II.

2.2 AGGREGATE

Aggregates shall conform to the following.

2.2.1 Fine Aggregate

Fine aggregate shall conform to the quality and gradation requirements of ASTM C 33.

2.2.2 Coarse Aggregate

Coarse aggregate shall conform to ASTM C 33. Maximum coarse aggregate size shall be 3/4 inch.

2.3 CHEMICAL ADMIXTURES

Chemical admixtures, when required or permitted, shall conform to the appropriate specification listed. Admixtures shall be furnished in liquid form and of suitable concentration for easy, accurate control of dispensing.

2.3.1 Air-Entraining Admixture

ASTM C 260 and shall consistently entrain the air content in the specified ranges under field conditions.

2.3.2 Accelerating Admixture

ASTM C 494, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

2.3.3 Water-Reducing or Retarding Admixture

ASTM C 494, Type A, B, or D, except that the 6-month and 1-year compressive and flexural strength tests are waived.

2.3.4 High-Range Water Reducer

ASTM C 494, Type F or G, except that the 6-month and 1-year strength requirements are waived. The admixture shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.3.5 Other Chemical Admixtures

Chemical admixtures for use in producing flowing concrete shall comply with ASTM C 1017, Type I or II. These admixtures shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.4 CURING MATERIALS

2.4.1 Impervious-Sheet

Impervious-sheet materials shall conform to ASTM C 171, type optional, except, that polyethylene sheet shall not be used.

2.4.2 Burlap and Cotton Mat

Burlap and cotton mat used for curing shall conform to AASHTO M 182.

2.5 WATER

Water for mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of COE CRD-C 400.

2.6 LATEX BONDING AGENT

Latex agents for bonding fresh to hardened concrete shall conform to ASTM C 1059.

2.7 EPOXY RESIN

Epoxy resins for use in repairs shall conform to ASTM C 881, Type V, Grade 2. Class as appropriate to the existing ambient and surface temperatures.

PART 3 EXECUTION

3.1 PREPARATION FOR PLACING

Joints shall be installed at locations indicated and as shown on the contract drawings.

Before commencing concrete placement, the following shall be performed. Surfaces to receive concrete shall be clean and free from frost, ice, mud, and water. Forms shall be in place, cleaned, coated, and adequately supported, in accordance with Section 03100 STRUCTURAL CONCRETE FORMWORK. Reinforcing steel shall be in place, cleaned, tied, and adequately supported, in accordance with Section 03200 CONCRETE REINFORCEMENT. Transporting and conveying equipment shall be in-place, ready for use, clean, and free of hardened concrete and foreign material. Equipment for consolidating concrete shall be at the placing site and in proper working order. Equipment and material for curing and for protecting concrete from weather or mechanical damage shall be at the placing site, in proper working condition and in sufficient amount for the entire placement. When hot, windy conditions during concreting appear probable, equipment and material shall be at the placing site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete.

3.1.1 Foundations

3.1.1.1 Preparation of Subgrade

Subgrade upon which concrete is to be placed shall be excavated and prepared in accordance with Section 02300 EARTHWORK.

3.2 TRANSPORTING CONCRETE TO PROJECT SITE

Concrete shall be transported to the placing site in truck mixers or by approved pumping equipment. Non-agitating equipment, other than pumps, shall not be used for transporting lightweight aggregate concrete.

3.3 CONVEYING CONCRETE ON SITE

Concrete shall be conveyed from mixer or transporting unit to forms as rapidly as possible and within the time interval specified by methods which will prevent segregation or loss of ingredients using following equipment. Conveying equipment shall be cleaned before each placement.

3.3.1 Trucks

Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C 94. Non-agitating equipment shall be used only for transporting plant-mixed concrete over a smooth road and when the hauling time is less than 15 minutes. Bodies of non-agitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

3.3.2 Chutes

When concrete can be placed directly from a truck mixer, agitator, or non-agitating equipment, the chutes normally attached to this equipment by the manufacturer may be used. A discharge deflector shall be used when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete.

3.3.3 Concrete Pumps

Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type; pneumatic placing equipment shall not be used. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least 3 times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 4 inches. Aluminum pipe shall not be used.

3.4 PLACING CONCRETE

Mixed concrete shall be discharged within 1-1/2 hours or before the mixer drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the

cement and aggregates. When the concrete temperature exceeds 85 degrees F, the time shall be reduced to 45 minutes. Concrete shall be placed within 15 minutes after it has been discharged from the transporting unit. Concrete shall be handled from mixer or transporting unit to forms in a continuous manner until the approved unit of operation is completed. Adequate scaffolding, ramps and walkways shall be provided so that personnel and equipment are not supported by in-place reinforcement. Placing will not be permitted when the sun, heat, wind, or limitations of facilities furnished by the Contractor prevent proper consolidation, finishing and curing. Sufficient placing capacity shall be provided so that concrete can be kept free of cold joints.

3.4.1 Depositing Concrete

Concrete shall be deposited as close as possible to its final position in the forms, and there shall be no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it will be effectively consolidated in horizontal layers not more than 12 inches thick, except that all slabs shall be placed in a single layer. Concrete to receive other construction shall be screeded to the proper level. Concrete shall be deposited continuously in one layer or in layers so that fresh concrete is deposited on in-place concrete that is still plastic. Fresh concrete shall not be deposited on concrete that has hardened sufficiently to cause formation of seams or planes of weakness within the section. Concrete that has surface dried, partially hardened, or contains foreign material shall not be used. When temporary spreaders are used in the forms, the spreaders shall be removed as their service becomes unnecessary. Concrete shall not be placed in slabs over columns and walls until concrete in columns and walls has been in-place at least two hours or until the concrete begins to lose its plasticity.

3.4.2 Consolidation

Immediately after placing, each layer of concrete shall be consolidated by internal vibrators, except for slabs 4 inches thick or less. The vibrators shall at all times be adequate in effectiveness and number to properly consolidate the concrete; a spare vibrator shall be kept at the jobsite during all concrete placing operations. The vibrators shall have a frequency of not less than 10,000 vibrations per minute, an amplitude of at least 0.025 inch, and the head diameter shall be appropriate for the structural member and the concrete mixture being placed. Vibrators shall be inserted vertically at uniform spacing over the area of placement. The distance between insertions shall be approximately 1-1/2 times the radius of action of the vibrator so that the area being vibrated will overlap the adjacent just-vibrated area by a reasonable amount. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer if there is such. Vibrator shall be held stationary until the concrete is consolidated and then vertically withdrawn slowly while operating. Form vibrators shall not be used unless specifically approved and unless forms are constructed to withstand their use. Vibrators shall not be used to move concrete within the forms. Slabs 4 inches and less in thickness shall be consolidated by properly designed vibrating screeds or

other approved technique. Frequency and amplitude of vibrators shall be determined in accordance with COE CRD-C 521. Grate tampers ("jitterbugs") shall not be used.

3.4.3 Hot Weather Requirements

Conform to ACI 305R.

3.4.4 Cold Weather Requirements

Conform to ACI 306R.

3.4.5 Placing Flowable Concrete

If a plasticizing admixture conforming to ASTM C 1017 is used or if a Type F or G high range water reducing admixture is permitted to increase the slump, the concrete shall meet all requirements of paragraph GENERAL REQUIREMENTS in PART 1. Extreme care shall be used in conveying and placing the concrete to avoid segregation. Consolidation and finishing shall meet all requirements of paragraphs Placing Concrete, Finishing Formed Surfaces, and Finishing Unformed Surfaces. No relaxation of requirements to accommodate flowable concrete will be permitted.

3.4.6 Expansion Joints

Installation of expansion joints and sealing of these joints shall conform to the requirements of Section 03250 EXPANSION JOINTS, CONSTRUCTION JOINTS, AND WATERSTOPS.

3.4.7 Waterstops

Waterstops shall be installed in conformance with the locations and details shown on the drawings using materials and procedures specified in Section 03250 EXPANSION JOINTS.

3.4.8 Dowels

Dowels shall be installed at the locations shown on the drawings and to the details shown, using materials and procedures specified in Section 03200 CONCRETE REINFORCEMENT and herein.

END OF SECTION

SECTION 03410

STRUCTURAL PRECAST CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Solid flat slab floor panels.

B. Grout packing.

C. Openings for connection devices.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 05120 – Structural Steel: Placement of anchorage and connection devices.

1.3 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Section 05120 – Structural Steel: Anchorage devices for precast slabs.

1.4 RELATED SECTIONS

A. Section 05120 – Structural Steel.

1.5 REFERENCES

A. ANSI/AWS D1.1 - Structural Welding Code - Steel.

B. ASTM A36 - Structural Steel.

C. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

D. ASTM C150 - Portland Cement.

E. PCI MNL-116 - Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

F. PCI MNL-120 Design Handbook - Precast and Prestressed Concrete.

1.6 DESIGN REQUIREMENTS

A. Size components to withstand design loads in a restrained condition as follows:

1. Horizontal Assembly: 250 lb/sq ft live and dead loads.

B. Maximum Allowable Deflection: 1/360

C. Design members exposed to the weather to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

D. Design system to accommodate construction tolerances, deflection of other structural members.

1.7 SUBMITTALS

A. Submit shop drawings under provisions of Section 01330.

SD-02 Shop Drawings

Submit shop drawings indicating layout, unit locations, fabrication details, unit identification marks, reinforcement, connection details, support items, and sealed by a Professional Structural Engineer.

SD-05 Design Data

Indicate design loads, deflections, cambers, bearing requirements, and special conditions.

SD-03 Product Data

Submit product data indicating standard component configurations, design loads, deflections, cambers, and bearing requirements.

SD-08 Manufacturer’s Instructions

Submit fabricator's installation instructions under provisions of Section 01330.

1.8 QUALITY ASSURANCE

A. Perform Work in accordance with the requirements of PCI MNL-116, PCI MNL-123, and PCI MNL-120.

1.9 QUALIFICATIONS

A. Fabricator: Company specializing in manufacturing the work of this section with minimum 3 years documented experience.

B. Erector: Company specializing in erecting the work of this section with 3 years experience and approved by fabricator.

C. Design precast concrete members under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the Commonwealth of Massachusetts.

1.10 REGULATORY REQUIREMENTS

A. Conform to ACI 318 and applicable BOCA code for design load and construction requirements applicable to work of this section.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01015.

B. Store and protect products under provisions of Section 01015.

C. Handle precast members in position consistent with their shape and design. Lift and support only from support points.

D. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.

E. Protect members to prevent staining, chipping, or spalling of concrete.

F. Mark each member with date of production and final position in structure.

1.12 SEQUENCING AND SCHEDULING

A. Coordinate the work of framing components not pretensioned but associated with the work of this section.

PART 2 PRODUCTS

2.1 FABRICATORS

A. Approved by Engineer.

2.2 MATERIALS

A. Cement: White Portland, conforming to ASTM C150, Type I or III.

B. Aggregate, Sand, Water, Admixtures: Determined by precast fabricator as appropriate to design requirements and PCI MNL-116.

2.3 REINFORCEMENT

A. Reinforcing Steel: ASTM A615, deformed steel bars.

2.4 ACCESSORIES

A. Connecting and Supporting Devices: ASTM A36 carbon steel framing members prime painted. Do not paint surfaces in contact with concrete or surfaces requiring field welding.

B. Grout: Non-shrink, non-metallic; minimum yield strength of 8,000 psi at 28 days.

2.5 FABRICATION

A. Fabrication procedure to conform to PCI MNL-116.

B. Maintain plant records and quality control program during production of precast members. Make records available upon request.

C. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are embedded and located as indicated on shop drawings.

2.6 FINISHING

A. Ensure exposed-to-view finish surfaces of precast concrete members are uniform in color and appearance.

B. Cure members under identical conditions to develop required concrete quality, and minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

C. Plant Finish: Finish A. Normal plant finish; surface may contain small surface holes caused by air bubbles, minor chips, or spalling at edges or ends, without major discoloration.

2.7 TOLERANCES

A. Conform to PCI MNL-116.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that site conditions are ready to receive work and field measurements are as shown on shop drawings.

B. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

A. Prepare support equipment for the erection procedure, temporary bracing, and induced loads during erection.

3.3 ERECTION

A. Erect members without damage to structural capacity, shape, or finish. Replace or repair damaged members.

B. Align and maintain uniform horizontal and vertical joints, as erection progresses.

C. Maintain temporary bracing in place until final support is provided. Protect members from staining.

D. Provide temporary lateral support to prevent bowing, twisting, or warping of members.

E. Adjust differential camber between precast members to tolerance before final attachment.

F. Secure units in place. Perform welding, in accordance with ANSI/AWS D1.1.

3.4 ERECTION TOLERANCES

A. Erect members level and plumb within allowable tolerances.

B. Design and erect to the following tolerances:

1. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch/10 feet and 3/8 inch in 100 feet non-cumulative.

2. Maximum Offset from True Alignment Between Members: ¼ inch.

3. Maximum Variation From Dimensions Indicated on Reviewed Shop Drawings: Plus or minus 1/8 inch.

C. Exposed Joint Dimension: 3/8 inch plus or minus 1/4 inch.

D. When members cannot be adjusted to conform to design or tolerance criteria, cease work and advise Engineer. Execute modifications as directed.

3.5 PROTECTION

A. Protect members from damage caused by field welding or erection operations.

B. Provide non-combustible shields during welding operations.

3.6 CLEANING

A. Clean weld marks, dirt, or blemishes from surface of exposed members.

END OF SECTION

DIVISION 5—METAL

SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members, support members, columns, and bracing.

B. Baseplates.

C. Grouting under baseplates.

1.2 REFERENCES

A. ASTM A36 – Structural Steel.

B. ASTM A307 – Carbon Steel Externally Threaded Standard Fasteners.

C. ASTM A325 – High Strength Bolts for Structural Steel Joints.

D. AWS A2.0 – Standard Welding Symbols.

E. AWS D1.1 – Structural Welding Code.

F. AISC – Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.

G. SSPC – Steel Structures Painting Council.

1.3 SUBMITTALS

A. Submit under provisions of Section 01330.

SD-02 Shop Drawings:

1. Indicate profiles, sizes, spacing, and locations of structural members, openings, attachments, fasteners.
2. Connections not detailed.
3. Cambers.
4. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.

SD-07 Certificates:

1. Manufacturer's Mill Certificate: Submit certifying that products meet or exceed specified requirements.

2. Welders' Certificates: Submit certifying welders employed on the work and verifying AWS qualifications within the previous 12 months.

1.4 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC – Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings.

1.5 QUALIFICATIONS

A. Fabricator: Company specializing in performing the work of this Section with minimum five years documented experience.

B. Erector: Company specializing in performing the work of this Section with minimum five years documented experience.

C. Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the place where the project is located.

1.6 FIELD MEASUREMENTS

A. Verify that field measurements are as shown on Drawings.

PART 2 PRODUCTS

2.1 MATERIALS

A. Structural Steel Members: ASTM A36.

B. Bolts, Nuts, and Washers: ASTM A325.

C. Anchor Bolts: ASTM A307.

D. Welding Materials: AWS D1.1; type required for materials being welded.

E. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.

F. Shop and Touch-Up Primer: SSPC Paint 15, Type 1, red oxide.

2.2 FABRICATION

A. Continuously seal joined members by continuous welds. Grind exposed welds smooth.

2.3 FINISH

A. Shop prime structural steel members. Do not prime surfaces that will be field welded or in contact with concrete.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 ERECTION

A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

B. Field weld components indicated on Drawings.

C. Do not field cut or alter structural members without approval of Engineer.

D. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.3 ERECTION TOLERANCES

A. Maximum Variation From Plumb: ¼ inch.

B. Maximum Offset From True Alignment: ¼ inch.

3.4 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01410.

END OF SECTION

SECTION 05520

HANDRAILS AND RAILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel pipe handrails, balusters, and fittings.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 05120 – Structural Steel: Placement of anchors on structural steel framing.

1.3 RELATED SECTIONS

A. Section 05120 – Structural Steel: Attachment plates and angles including anchorage.

B. Section 05531 – Gratings and Floor Plates.

1.4 REFERENCES

A. ASTM A53 – Hot Dipped, Zinc-Coated Welded and Seamless Steel Pipe.

B. ASTM A386 - Zinc-Coating (Hot-Dip) on Assembled Steel Products.

1.5 DESIGN REQUIREMENTS

A. Railing assembly, wall rails, and attachments to resist lateral force of 100 lbs at any point without damage or permanent set.

1.6 SUBMITTALS

A. Submit under provisions of Section 01330.

SD-02 Shop Drawings

Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1.7 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Approved by Engineer.

2.2 STEEL RAILING SYSTEM

A. Pipe: ASTM A53, Schedule 40.

B. Rails and Posts: 1 ½ inch diameter steel pipe; welded or threaded joints.

C. Fittings: Elbows, T-shapes, wall brackets, escutcheons: cast steel.

D. Mounting: Brackets and flanges.

E. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.

F. Splice Connectors: Steel concealed spigots.

G. Galvanizing: 1.25 oz/sq ft zinc coating in accordance with ASTM A386.

2.3 FABRICATION

A. Fit and shop assemble components in largest practical sizes, for delivery to site.

B. Fabricate components with joints tightly fitted and secured.

C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

E. Accurately form components to each other and to structure.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects.

C. Provide anchors, plates, and angles required for connecting railings to structure. Anchor railing to structure.

D. Field weld anchors as indicated on shop drawings.

E. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.4 ERECTION TOLERANCES

A. Maximum Variation From Plumb: ¼ inch per 10 feet, non-cumulative.

B. Maximum Offset From True Alignment: ¼ inch.

END OF SECTION

SECTION 05531

GRATINGS AND FLOOR PLATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formed metal floor gratings.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 05120 – STRUCTURAL STEEL: Steel walkway framing.

1.3 RELATED SECTIONS

A. Section 05120 – STRUCTURAL STEEL.

B. Section 05520 – HANDRAILS AND RAILINGS.

1.4 REFERENCES

A. ANSI/AWS D1.1 - Structural Welding Code, Steel.

B. ANSI/NAAMM MBG 531 - Metal Bar Grating Manual.

C. ASTM A36 - Structural Steel.

D. ASTM A123 - Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.

E. ASTM A510 - General Requirements for Wire Rods and Course Round Wire, Carbon Steel.

F. ASTM A525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

1.5 PERFORMANCE REQUIREMENTS

A. Design Live (Pedestrian) Load: Uniform load of 100 lb/sq ft minimum; concentrated load of 300 lbs.

B. Maximum Allowable Deflection Under Live Load: 1/240; size components by single support design.

C. Maximum Spacing Between Bars: To restrict pedestrian shoe heels.

1.6 SUBMITTALS

A. Submit under provisions of Section 01330.

SD-02 Shop Drawings

1. Indicate details of component supports, openings, perimeter construction details, and tolerances.

2. Indicate welded connections using standard ANSI/AWS A2.4 welding symbols. Indicate net weld lengths.

SD-03 Product Data

Provide span and deflection tables.

SD-06 Manufacturer's Instructions

Indicate special installation instruction requirements for perimeter framing.

1.7 QUALIFICATIONS

A. Design gratings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the Commonwealth of Massachusetts.

B. Welders' Certificates: Submit under provisions of Section 01330, certifying welders employed on the work, verifying AWS qualification within the previous 12 months.

1.8 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.9 COORDINATION

A. Coordinate work under provisions of Section 05520 – Handrails and Railings.

B. Coordinate the work with placement of structural steel walkway steel.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. As approved by Engineer.

2.2 MATERIALS

A. Formed Steel for Welding and Riveting: ASTM A36, of rectangular shape.

B. Cross Bars: ASTM B510.

C. Welding Materials: ANSI/AWS D1.1; type required for materials being welded.

D. Touch-Up Primer for Galvanized Surfaces: SSPC 20 Type I Inorganic.

2.3 ACCESSORIES

A. Fasteners and Saddle Clips: Galvanized steel.

1. Perimeter Closure: Of same material as grating.

2.4 FABRICATION

A. Grating Type: ANSI/NAAMM MBG 531, Welded Type.

B. Weld joints of intersecting metal sections.

C. Fabricate support framing for openings.

D. Top Surface: Serrated.

2.5 FINISHES

A. Galvanizing: ASTM A525 to G90 weight.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that supports and anchors are correctly positioned.

3.2 INSTALLATION

A. Install components in accordance with manufacturer's instructions.

B. Place frames in correct position, plumb and level.

C. Mechanically cut galvanized finish surfaces. Do not flame cut.

D. Anchor by bolting through saddle clips.

E. Set perimeter closure flush with top of grating and surrounding construction.

F. Secure to prevent movement.

3.3 TOLERANCES

A. Conform to ANSI/NAAMM MBG 531.

B. Maximum Space Between Adjacent Sections: ¼ inch.

C. Maximum Variation From Top Surface Plane of Adjacent Sections: 1/16 inch.

END OF SECTION

DIVISION 10—SPECIALTIES

SECTION 10100

TRAFFIC CONTROL

PART 1 GENERAL

1.1 REFERENCES

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

COMMONWEALTH OF MASSACHUSETTS,
DEPARTMENT OF HIGHWAYS

State Specifications — (1988, R 1998) Standard Specifications for Highways and Bridges, as amended. The publication will be referred to as the "State Specifications."

U.S. DEPARTMENT OF TRANSPORTATION

MUTCD — (2000) Manual of Uniform Traffic Control Devices, as amended, including Part 6. The publication will be referred to as the "MUTCD."

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES AND REGISTER:

SD-03 Product Data

Sign Material.

Sign Supports.

Provide printed copies of the manufacturer's literature of the products proposed for use, prior to installation.

SD-11 Closeout Submittals

Traffic Control Police Detail Invoices; G

Submit copies of invoices from police agencies for traffic control police officers. Invoices must include officer's name, date and time of duty, unit rates and application of overtime rates.

PART 2 PRODUCTS

2.1 SAFETY SIGNING

Materials shall conform to paragraph 850.42 of the State Specifications. Sign legends shall conform to standard legends specified in the MUTCD and as indicated on the drawings.

2.2 UNIFORMED POLICE OFFICERS

Uniformed police officers from the City of Pittsfield Police Department shall be used to the extent they are available, when necessary. To arrange for traffic details, the Excavation Subcontractor shall contact the Detail Officer at (413) 448-9723 with sufficient lead-time. The General Contractor shall be responsible for payment of police details for traffic control.

2.1.1 Uniform

Officers shall be clothed in a suitable and characteristic uniform that will readily distinguish them from all other employees. Officers shall be attired with regulation caps and blaze orange vests with or without white stripes. Extra reflectorization and lighting may be necessary at night.

2.1.2 Police Powers

Officers shall have police powers granted by the proper authorities and shall wear an exposed badge.

2.1.3 Qualifications and Responsibilities

Officers for traffic control shall have had previous experience directing traffic for construction operations. Officers shall have been given specific instructions from the Contractor as to their duties and responsibilities, both to the public and to their fellow workers on the job. They shall handle the movement of the traveling public and shall do all that is reasonable to expedite that movement in a safe manner. They shall have authority to direct the actions of the construction vehicles as well as vehicles of the traveling public.

2.1.4 Other Personnel

The Excavation Subcontractor shall arrange for a Sheriff or other approved personnel to be used for flagging construction traffic when uniform police officers are not available upon approval of the Engineer.

PART 3 EXECUTION

3.1 ALLOWABLE TRAFFIC ROUTES

For materials being disposed of at the OPCA, the primary disposal route from areas of excavation will be along access roads constructed adjacent to parcels on the north (or west) side of the river between Lyman Street and Elm Street, across Lyman Street from parcel I9-4-201 to the GE owned Lyman Street parking lot and through the GE facility. A secondary disposal route shall include the use of Cove Street to East Street to Lyman Street and into the GE owned Lyman Street parking lot but this route shall only be used as conditions deem necessary.

Trucks delivering equipment, supplies, and materials to the site shall use appropriate public roads as indicated in the following:

- On the south (or east) side of the river, under no circumstances should Ashley Street be used. Day Street can be used for access by personal vehicles of construction personnel. Any other use of Day Street shall require Government approval.
- Use of Hathaway Street is permitted.
- The preferred route on the north (or west) side of the river shall be via Cove Street. However, as necessary, deliveries are permitted to enter the site through Root Place or Lyman Street via parcel I9-4-201.

END OF SECTION

DIVISION 11—EQUIPMENT

SECTION 11000

HOUSATONIC RIVER BYPASS GRAVITY FLOW SYSTEM

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

SLIDE GATES – Section 11160

PLASTIC PIPE – Section 15064

1.2 DESCRIPTION OF WORK

a. General Description of Phase 2

A 4,000-foot length of the Housatonic River, starting at Station 514+00 and extending downstream, is to be the subject of Phase 2 of the 1.5-Mile Reach Removal Action in Pittsfield, Massachusetts. This stretch of river shall be progressively diverted by damming the river at Station 514+00, and installing two 1,400 foot long (2,800 linear feet), 54 inch outside diameter (O.D.) pipe for gravity flow bypass. Bypass gravity flow will allow "dry" excavation and removal of contaminated sediment and soil, followed by restoration. The remediation work is expected to be completed in sequential lengths of approximately 500 to 800 feet in the river, with the gravity pipe being moved in each particular section to allow both sides of the river to be remediated. The two 54-inch O.D. pipes are capable of approximately 90 cubic feet per second (cfs) of flow each under gravity flow conditions. The total duration of the operation of the water diversion system is expected to be on the order of 2 to 3 years.

It is anticipated that the two 54-inch O.D. gravity pipes will be installed in lengths as needed to divert the river around the farthest downstream work area.

b. The Phase 2 bypass gravity flow system, in general, consists of installing, and making operational as a complete integral system, the following:

1. Two 54-inch O.D. HDPE mains approximately 1,400 linear feet each in length (downstream of dam location).

2. An engineered pipe restraint and anchoring system for each pipe.

3. Two 66-inch diameter slide gates with electric operators, one for each gravity pipe intake.

4. Project support facilities, including office trailer.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

A Downriver Pipe Arrangement Plan, showing the intended 54-inch pipe layout downriver of the dam the pipe restraint and anchoring system, including any pipe fittings, shall be submitted. The Downriver Pipe Arrangement Plan shall also include the intended method of arranging both 54-inch mains around each anticipated work area, providing for the flows mentioned in Subsection 1.2 and addressing in detail potential pipe-anchoring requirements and pipe-bending restrictions. The Plan shall also include the design of the outlet structure, including anchoring of the pipe at the discharge point and the erosion protection.

SD-02 Shop Drawings

Shop Drawings shall be submitted. At a minimum, the following shall be included with the Shop Drawings: literature, drawings, materials of construction, list of manufacturer's recommended spare parts for each item and a detailed sketch of the pipe anchoring system.

PART 2 SCOPE ITEMS/MATERIALS

2.1 54-INCH DIAMETER HDPE PIPE

a. The Excavation Subcontractor shall install two 54-inch O.D., SDR 21 high-density polyethylene (HDPE) gravity pipes of approximately 1,400 linear feet in length each (total of 2,800 linear feet) which are to be furnished by the General Contractor. Pipe shall be furnished in 40- or 50-foot lengths for assembly by the pipe supplier. Fittings shall be provided, as necessary, based on the Downriver Pipe Arrangement Plan. Pipe shall be CP CHEM Performance Pipe Driscoplex 4100 or equivalent, constructed of PE 3408 black polyethylene. Pipe will be required to operate in gravity flow conditions. The supplier will furnish the pipe and fittings to the site in 50-foot lengths and he shall fusion weld the pipe into 500-foot lengths with flanges at each end. The Excavation Contractor shall install the pipe.

b. Pipe and fittings shall be manufactured in accordance with the Plastics Pipe Institutes, Inc. (PPI) Polyethylene Pipe and Fittings Manufacturing.

c. The Excavation Subcontractor shall furnish and install an outlet structure designed to reduce outlet flow losses, thereby maximizing flow, on the discharge end of each of

the 54-inch O.D. HDPE pipes. The outlet structure shall be connected to a flanged section of 54-inch HDPE pipe for ease of relocation as the force mains/siphons are moved downriver through Phase 2. This structure must be designed to prevent erosion and to anchor the pipes at the discharge point.

d. A pipe restraint and anchor system shall be engineered, designed, furnished, and installed by the Excavation Subcontractor. The design of the pipe restraint and anchor system shall be submitted in the Downriver Pipe Arrangement Plan and shall be designed and stamped by a Professional Engineer registered by the Commonwealth of Massachusetts for the appropriate discipline(s). The pipe restraint and anchor system shall be designed to provide complete pipe restraint under any of the following conditions:

    - Water dammed and being conveyed via gravity flow.
    - Dam removed and river free-flowing unimpeded through the Phase 2 design section.

e. The pipe restraint and anchor system shall be engineered and designed in accordance with the pipe manufacturer's published recommendations and the PPI's Above Ground Applications for Polyethylene Pipe.

f. The pipe restraint and anchor system design shall consider both existing and restored riverbed conditions.

g. To aid in the design of the pipe restraint and anchor system, the Excavation Subcontractor shall utilize the information provided in the Pre-Design Document and the river hydrologic data included as an attachment to this specification.

h. The pipe restraint and anchor system may utilize rock anchors, soil or screw anchors, piles, straps, or other approved pipe restraint techniques.

i. The following design criteria shall be considered for the design of the pipe restraint and anchor system to be approved:

    - Minimum pipe bending radius.
    - Point-load stresses.
    - Shear, flexing, and bending strain and stresses.
    - Thermal expansion and contraction.
    - Deflection due to thermal expansion and contraction.
    - Buoyancy.
    - Frictional forces due to internal fluid flow.

- External forces on pipe due to river flow.

- Thrust forces at bends (change in direction of fluid flow) due to internal fluid flow.

- Net force of zero applied to connection with butterfly valves installed immediately downstream of dam.

j. The pipe supplier shall install gasketed 125/150# ANSI flanges where required to make connections to valves, and pipe spool sections. The flanges shall be provided with gaskets and bolts.

k. The Excavation Subcontractor shall furnish and install an inlet structure on each of the two gravity intakes. The inlet structure shall have a minimum 10-inch by 10-inch steel grate covering the inlet designed to keep out large debris that could become lodged in the pipe. The inlet structure shall, at a minimum, have two times the cross-sectional area of the 54-inch pipe at its inlet and shall be designed to minimize pipe entrance losses, thereby maximizing the gravity flow component of the river bypass system.

2.2 SLIDE GATES WITH ELECTRIC OPERATORS

a. The Excavation Subcontractor shall install two 66-inch diameter slide gates, one on each of the gravity flow intake pipes. The slide gates shall be furnished by the General Contractor (see Specification Section 11160).

PART 3 EXECUTION

3.1 GENERAL

a. All equipment shall be installed as shown in the Drawings and in conformance with manufacturer's recommendations and instructions and in accordance with generally accepted practices.

3.2 INSTALLATION

a. 54-Inch HDPE Gravity Flow Pipes

1. 54-inch HDPE pipe and fittings shall be handled in accordance with the manufacturer's handling instructions and in accordance with the PPI Material Handling Guide.

2. The installation shall conform with the manufacturer's instructions, an approved Pipe Restraint and Anchor System Plan, and the following current standards:

- PPI TR-33

- PPI TR-41
- PPI Inspections, Test and Safety Considerations
- PPI Polyethylene Joining Procedures
- PPI Material Handling Guide

3. All butt and saddle fusion welds must be made per the pipe manufacturer's instructions. Welds are to be made by fusion machine operators qualified by the fusion machine manufacturer's approved program. Current training certificates shall be provided.

4. Pertinent information pertaining to making welds shall be recorded for each weld made. At a minimum, the following shall be recorded:

   - Ambient weather conditions, including temperature, wind speed, cloud cover, and precipitation.

   - Operator's name and current certificate qualifying the operator to operate the equipment used.

   - Pressure applied, time of applied pressure, and temperature of joint.

5. Each weld shall have a unique weld number assigned and clearly marked with a weather-proof material that is compatible with the HDPE pipe material, on each side of the weld.

6. Pipe anchors and restraints shall be installed per anchor and pipe manufacturer's instructions and as indicated in the Downriver Pipe Arrangement Plan.

3.3 STARTUP AND TESTING

a. Startup and testing procedures shall be included in the River Bypass System Operation and Maintenance Manual.

END OF SECTION

SECTION 11160

SLIDE GATES

PART 1 - GENERAL

1.1 SCOPE

a. The Vendor shall furnish two (2) 66-inch self-contained aluminum slide gates, supplied with manually operated bearing or gear lift and any special tools required for installation and operation, to the project location. The slide gates will be installed by WESTON in the location shown in the Drawings. The slide gates shall not interfere with complete removal of stop logs. The upper portion of the slide gate frame can be secured to the elevated platform support members. The gates will be used to cut-off flow from upstream of the dam to two 54-inch culverts (with a flared 60-inch entrance); a 66-inch gate will be used to minimize hydraulic entrance losses.

b. The center of the slide gate opening will be installed at elevation 971.25 feet. The slide gate shall have a minimum upward vertical movement to place the bottom of the gate at elevation 976.5 feet when fully opened.

c. The slide gate shall be designed and constructed for operation in seating heads up to 10 feet and unseating heads up to 4.5 feet. Leakage allowance (0.1 gallons per minute per foot of seating perimeter) shall be maintained at seating heads of 0 feet (from center of gate).

PART 2 - PRODUCTS

2.1 QUALIFICATIONS

a. Slide gates shall be the products of established, reputable firms regularly engaged in the manufacture of these products.

2.2 MATERIALS OF CONSTRUCTION

a. All materials used in the construction of the gates shall be best suited for the application and shall conform to the following specifications:

1. Aluminum plate and shapes: ASTM-B211 Alloy 6061-T6
2. Bottom/J-Bulb Seal: Neoprene ASTM-CB610-625, D-2000
3. Slides: Ultra high molecular weight polyethylene (UHMW)
4. Fasteners: ASTM F593 & F594 Type 304 or 316
5. Stem: ASTM A-276 Type 304 & 316
6. Lift Nut: Solid bronze or bronze manganese.

2.3 SLIDE GATES

a. Slide gates shall be 66-inch self-contained with rising stem and of flatback or frame mount design for attachment to a head wall with anchor bolts. Slide gates shall be Model AC-31 as manufactured by Waterman Industries, Inc., or approved equivalent and shall be of new and current manufacture. Slide gates shall have aluminum gates and guide frames, Type 304 or 316 stainless steel stems, solid bronze or manganese bronze lift nut, ultra high molecular weight polyethylene (UHMW) guides, and seals shall be UHMW (sides and top) and neoprene (bottom) or neoprene J-bulb.

b. Guide frames shall be of extruded aluminum shape, of sufficient section to carry the operating forces of the gate and shall have UHMW polyethylene inserts on which the slide assembly travels to minimize friction. The seating surface shall have a minimum 1.5-degree angle to which a resilient J-Bulb seal shall be attached.

c. Dual headrails (yokes) shall be welded to the guide rails and so positioned that the slide is removable from the gate. The slide shall be aluminum plate suitably reinforced with extruded structural shapes for the head requirements specified and shall not deflect more than $1/360^{th}$ of the gate width under the design head. Side guides shall be welded to the slide, which will travel within the guides and place the cover in an angle corresponding to the seat surface of the guide frame assembly. The rising stem shall attach to the slide with a clevis and pin arrangement.

d. The stem shall be designed to withstand compression at least twice the rated output of the lift at 40 pounds of pull.

e. The leakage allowance for slide gates shall not exceed 0.1 gallons per minute per foot of seating perimeter under 0 to 10 feet of seating heads.

f. Manual operators shall be vertical plane movement with bearing or gear lifts and shall be positioned so they can be operated from the elevated walkway.

PART 3 - EXECUTION

3.1 SUBMITTALS

a. Ten (10) sets of fabrication drawings showing dimensions and details of construction of all slide gates, electric operators and appurtenances proposed for use shall be submitted to WESTON within 2 weeks of vendor receipt of purchase order.

b. Two (2) sets of operation and maintenance manuals shall be submitted with or before delivery of the slide gates to the site.

3.2 INSTALLATION

a. Slide gates will be installed by WESTON.

END OF SECTION

SECTION 11800

WATER TREATMENT SYSTEM

PART 1 GENERAL

1.1 SYSTEM OVERVIEW

This specification for the temporary water treatment system is performance based. The system will be required to treat wastewater generated from the following activities: initial dewatering of excavations, ongoing dewatering of excavations, dewatering of saturated sediments and soils conducted at the contaminated materials staging area, contaminated run-on collected at the contaminated materials staging area, and decontamination of trucks and other equipment conducted at various staging areas. The Excavation Subcontractor shall use the existing on-site treatment plant for treatment of all wastewater generated as part of the remediation work to be conducted in the Phase 1/Phase 2 Transition Area (approximately Station 514+00 to the upstream limit of the Elm Street Bridge).

Currently, electrical power service (3-phase, 440-volt, 600-amp) is provided by the Western Massachusetts Electric Co. by underground conduit to the treatment system. An emergency power supply will not be provided for operation of the treatment system. However, the General Contractor shall be responsible for coordinating with the Excavation Subcontractor to curtail the excavation dewatering operations in the event that the storage capacity of the treatment system will be exceeded or if there is an interruption in electrical service.

The work covered by this specification includes the handling and treatment of water from the point where it enters the storage tank to the discharge point in the river. It does not include conveyance piping from the discharge of the excavation dewatering system to the treatment system as described in Section 02464.

1.2 SYSTEM DESCRIPTION

The existing temporary water treatment system shall be operated and maintained to comply with the design conditions described below. The Excavation Subcontractor shall supply auxiliary systems and equipment required to maintain a complete and workable treatment system including, but not limited to, required piping between units, auxiliary equipment for plumbing, and controls and interfaces between auxiliary equipment and the treatment system. Chemical additives will be allowed to enhance the treatment system. The installation shall be constructed to prevent freezing of system components.

The system shall include a 300,000-gallon minimum storage tank, Modutank or equivalent, to be located within the general area available as shown on the Drawings. The system shall include processes for particulate settling, oil/water separation (LNAPL and DNAPL, if encountered), filtration, granular activated carbon treatment, and discharge into the Housatonic River. Periodic shutdown and/or modification of the treatment system will be

necessary to remove accumulated sediment from the large storage/equalization tank. The system shall include discharge piping. The system discharge shall be limited to 500 gallons per minute as stated in the NPDES Permit Exclusion issued by the EPA to the General Contractor under Phase 1 of the 1.5-Mile Removal Action (EPA, September 2002, 07-0095). Increases in the effluent discharge flow rate shall need Government approval. Effluent shall be discharged at an approved location upstream of the temporary dam at Station 514+00 at a point as close as possible to the inlet of the gravity bypass system to minimize the recontamination of restored areas above the dam. Discharge shall be such that it does not result in scouring of the riverbed or riverbank. The 12-inch-diameter steel pipe sleeve previously installed by the General Contractor under the haul road for the treatment system discharge line shall continue to be used by the Excavation Subcontractor. Alternatively, a new location can be proposed by the Excavation Subcontractor for approval by the General Contractor. The Excavation Subcontractor shall relocate the discharge pipe if a new location is approved.

The Excavation Subcontractor shall man the temporary water treatment system with competent personnel while all dewatering and/or treatment processes are in progress. Therefore, the temporary water treatment system shall be manned 24 hours a day or as necessary if water treatment and/or dewatering processes are completed outside the hours of the normal work day. Security provisions shall be provided as applicable by the Excavation Subcontractor to ensure that any incidents concerning the temporary water treatment system will be addressed in a timely fashion according to the NPDES Permit Exclusion (EPA, September 2002, 07-0095) granted for the project.

1.2.1 Influent Characteristics

Treatment plant influent will be generated from dewatering of the excavation located within the river, decontamination of site materials and equipment, contaminated run-on collected at the contaminated materials staging area, and dewatering of soil and sediments in the contaminated materials staging area. The most significant volume of water is anticipated to be generated from excavation dewatering. Initially, the Excavation Subcontractor will pump down river water within the excavation before the start of excavation until 6 inches of water remain in the area. During this initial dewatering, water will be discharged directly back to the river. The final 6 inches of water and all subsequent water pumped from the excavation will then be pumped to the treatment system. Water that must be pumped by the Excavation Subcontractor from an active excavation following a flooding event will either be pumped directly back to the river until 6 inches of water remains or it will be pumped to the treatment system based on the conditions present following consultation with the Government. Once the excavation is dewatered, the Excavation Subcontractor will be required to maintain the excavation in a generally dry condition to facilitate excavation and restoration. It is anticipated that pumping will be required 24 hours per day while excavation and restoration of the Transition Area of Phase 2 is occurring. Under certain conditions, pumping of the active work areas may be temporarily discontinued following review and approval by the General Contractor.

Other sources of water to be generated during the Removal Action such as water draining from saturated soils and sediments, contaminated run-on, and decontamination wash water will be delivered to the treatment system periodically as necessary by truck in batches.

The existing treatment system was designed to accommodate a design flow of 400 gallons per minute, minimum available head of 0 feet, and intermittent flow conditions. These parameters are also applicable to the Phase 1/Phase 2 Transition Area.

Additional influent characteristics describing the potential concentrations of contaminants in the groundwater at the areas of excavation are included in Table 11800-1. The influent data provided in this table are based on three pore water samples collected where groundwater discharges to the riverbed in the first reach. Additional data generated during operation of the treatment plant during Phase 1 construction are available and can be provided to the Excavation Subcontractor upon request. The quality of the water removed by the dewatering system is expected to vary depending on the location of the work being performed in the Housatonic River. The influent data included in Table 11800-1 represent the highest result of three pore water samples collected from the reach of the river to be excavated in Phase 1.

1.2.2 Design Criteria

Water treatment system effluent shall meet the discharge limits included in Table 11800-1. These discharge criteria have been approved by the U.S. Environmental Protection Agency (USEPA) in the NPDES Permit Exclusion (EPA, September 2002, 07-0095) granted for this project. All criteria established under the NPDES Permit Exclusion shall be followed accordingly.

1.2.3 System Location

The location of the water treatment system, including the discharge piping and the Modutanks, shall not change for the Transition Area.

1.3 SUBMITTALS

Government approval is required for submittals with a “G” designation; submittals not having a “G” designation are for information only. When used, a designation following the “G” designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES AND REGISTER:

SD-10 Operations and Maintenance Data

Operations and Maintenance Manual Addenda; G.

Excavation Subcontractor shall submit for government approval addenda to the Operations and Maintenance Plan as appropriate to cover any new equipment installed or any proposed

changes in operation or maintenance procedures. A draft of an addenda shall be submitted before delivery of any new equipment to the site.

1.4 QUALIFICATIONS

A Licensed Professional Engineer shall review all system design submittals, including but not limited to, the temporary water treatment plant processes and layout design, the electrical line drawing, the piping layout, and the foundation/support system design.

1.5 FIELD MEASUREMENTS

The Excavation Subcontractor shall verify all dimensions in the field and shall advise the General Contractor of any discrepancy before performing the work.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Standard Products

Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate items that have been in satisfactory use. Equipment shall be supported by a service organization that is, in the opinion of the Government, reasonably convenient to the site.

For the purposes of this specification, it is assumed that the treatment system shall include processes for particulate settling, oil/water separation (LNAPL and DNAPL), filtration, and granular activated carbon treatment. However, this is a performance specification and the Excavation Subcontractor shall select unit processes, as appropriate, to meet the discharge criteria. The Excavation Subcontractor shall not be bound to the particular processes identified in this specification.

2.2 GENERAL REQUIREMENTS

2.2.1 Electrical Work

Manual or automatic control and protective or signal devices required for the operation specified and any control wiring required for controls and devices shall be provided.

Electrical wiring for the treatment system shall meet the electrical requirements for wet environments, including GFI protection.

2.2.2 Access Walkways, Platforms, Ladders, and Handrails

Walkways, platforms, and ladders shall be provided for access to equipment for operation and maintenance. They shall be designed and constructed in accordance with 29 CFR 1926 and 29 CFR 1910.

2.2.3 Utilities

All utilities have previously been brought to the site by the General Contractor, and no additional work is anticipated.

2.2.4 Secondary Containment

Secondary containment (previously constructed by the General Contractor) is required for the entire treatment system. This includes but is not limited to the two 150,000-gallon Modutanks, sand filters, activated carbon units, storage tanks or equalization basins, pumps, and piping. Sump(s) and pumps shall be provided by the Excavation Subcontractor as needed to transfer water out of the secondary containment areas to the head of the temporary water treatment system.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

Equipment delivered and placed in storage shall be protected from the weather, excessive humidity, excessive temperature variation, and dirt, dust, or other contaminants.

3.2 SAMPLING AND ANALYSIS

The General Contractor will perform sampling and analysis, for all compounds listed in Table 11800-1 on a monthly basis. The General Contractor shall perform sampling and analysis of the water between carbon units in series (if applicable) at the same frequency; however, these samples will be analyzed for only the organic compounds in Table 11800-1. Monthly analytical reports, with quality control information, will be developed by the General Contractor and submitted to the Government by the 28th of each month. The Government shall be notified immediately of any exceedances. Appropriate corrective actions as determined in consultation with the Government and the General Contractor shall be implemented by the Excavation Subcontractor.

All sampling, analysis, and quality control procedures shall follow the project QAPP as referenced in the specifications.

3.3 SYSTEM STARTUP

Although continuous operation of the treatment system from Phase 1 to the Phase 1/Phase 2 Transition Area is anticipated, if the treatment system is shut down for an extended period following the completion of Phase 1, the Excavation Subcontractor shall restart the treatment system. The Excavation Subcontractor shall make any necessary modifications to ensure that the plant is fully operable and meets the requirements of the performance specifications prior to initiation of normal plant operations. Criteria for completion of startup include steady-state operation of the facility with all system components and effluent quality meeting the performance criteria for a 2-week period. The Excavation Subcontractor shall provide 48-hour notice of system startup to the Government.

3.4 PROCESS RESIDUALS

Residuals generated from the operation of the temporary water treatment system shall be collected, contained, segregated, sampled, and disposed of by the Excavation Subcontractor in accordance with project ARARs. All residuals, except for spent activated carbon and NAPL-saturated residuals, can be disposed of in the appropriate OPCA cell. Spent activated carbon shall be sent off-site for regeneration or disposal, and shall be sampled, if necessary, to verify whether or not the material is regulated under TSCA. NAPL-saturated residuals will also be disposed of off-site in accordance with ARARs and applicable regulations.

3.5 SPILL RESPONSE AND DISCHARGE CONTROL

The Excavation Subcontractor shall provide on-site equipment and materials for spill response for any spills that are generated in the temporary water treatment system or generated as a result of water treatment system construction, operation, or maintenance activities. The Excavation Subcontractor shall follow the Spill and Discharge Control Plan developed for Phase 1 construction activities.

The Excavation Subcontractor shall comply with all federal, state, and local oil and hazardous waste regulations, including but not limited to: 40 CFR 264 Subpart D, 40 CFR 280 Subpart E, 40 CFR 110 112, 310 CMR 40 Subpart C, 314 CMR 15.00, 310 CMR 30.000, and 310 CMR 30.520 or as indicated in the ARARs table provided as Attachment 1 to these specifications. The Excavation Subcontractor shall provide methods, means, and facilities required to prevent contamination of soil, water, atmosphere, uncontaminated structures, equipment, or material by the discharge of wastes from spills due to the Excavation Subcontractor's operations. The Excavation Subcontractor shall provide equipment and personnel to perform emergency measures required to contain any spillages and to remove spilled materials and soils or liquids that become contaminated due to spillage. The Excavation Subcontractor shall provide equipment and personnel to perform decontamination measures that may be required to remove spillage from previously uncontaminated structures, equipment, or material. All spilled material, all decontamination residues, and all contaminated soils, absorbent materials, solvents, and other materials

resulting from the cleanup of spilled or discharged substances shall be properly stored, labeled, and disposed of by the Excavation Subcontractor.

No discharge of oil, sufficient to cause a sheen (as defined in 40 CFR 112) shall occur to the Housatonic River. The discharge of a sheen of oil shall constitute an oil spill and must be reported immediately to the USEPA, the MDEP Emergency Response Section, and the National Response Center [(800) 424-8802].

Table 11800-1

Performance Specification For Treatment System
Discharge Criteria And Porewater Quality

Compound	CAS Registry No.	Discharge Criterion (ppb)	Pore Water (Influent) Quality[a] (ppb)
Organics			
1,2,4,5-Tetrachlorobenzene	95-94-3	100	11 U
1,2,4-Trichlorobenzene	120-82-1	70	11 U, 0.78 J
1,2-Dichlorobenzene	95-50-1	75	11 U
1,3-Dichlorobenzene	541-73-1	100	11 U
1,4-Dichlorobenzene	106-46-7	100	11 U
2-Butanone	78-93-3	100	2.5 R
Acetone	67-64-1	100	21 J
Benzene	71-43-2	5	3.9 J
Bis(2-ethylhexyl) phthalate	117-81-7	100	11 U
Chlorobenzene	108-90-7	100	1.6
Chloroform	67-66-3	100	0.5 U
Cis-1, 2-Dichloroethylene	156-59-2	70	Not available
Diethyl phthalate	84-66-2	100	11 U
Ethylbenzene	100-41-4	*	0.5 U
Polychlorinated biphenyls	1336-36-3	0.5	**2.4**
Polynuclear Aromatic Hydrocarbons (PAHs)	Various	100	1 J, 11 U[b]
Pentachlorobenzene	608-93-5	100	11 U
Phenol	108-95-2	100	11 U
Tert-butyl methyl ether (MTBE)	1634-04-4	70	Not available
Toluene	108-88-3	*	0.5 U
Trichloroethylene	79-01-6	5	0.5 U
Xylene(s)	1330-20-7	*	0.5 U
Inorganics			
Arsenic	7440-38-2	50	4.6 U
Barium	7440-39-3	100	55.9
Beryllium	7440-41-7	4	0.56
Chromium (total)	7440-47-3	100	2.2 U
Cobalt	7440-48-4	100	3 U
Copper	7440-50-8	100	5.8 J
Lead	7439-92-1	50	3.7 U
Nickel	7440-02-0	100	2.9 U

Table 11800-1

Performance Specification For Treatment System Discharge Criteria And Porewater Quality (Continued)

Compound	CAS Registry No.	Discharge Criterion (ppb)	Pore Water (Influent) Quality[a] (ppb)
Thallium	7440-28-0	2	3.9 U
Tin	7440-31-5	100	3.8 UJ
Vanadium	7440-62-2	100	2.9 U
Zinc	7440-66-6	500	**656**

* Total BTEX cannot exceed 100 ppb.

U - Compound was not detected in the sample above the reported detection limit.

J - Concentration stated represents an estimated value.

R - Result was rejected during data validation.

Not Available – Data not available.

Bold - Indicates result exceeds one of the stated criteria.

[a] Highest results of three pore water samples collected from the reach of the river to be excavated in Phase 1.

[b] Based on highest results for individual PAH compounds.

END OF SECTION

SPECIFICATION 11800 ATTACHMENT

NPDES PERMIT EXCLUSION LETTER AND AMENDMENT FOR ZINC

07-0095

United Stated Environmental Protection Agency
EPA New England
One Congress Street
Boston, Massachusetts 02114-2023

September 20, 2002

Joel S. Lindsay
Weston Solutions, Inc.
10 Lyman Street
Pittsfield, MA 01201

Re: NPDES Permit Exclusion
1.5 Mile Reach
GE-Pittsfield/Housatonic River Site

Dear Mr. Lindsay:

Based upon information contained in the *Final Design Specifications, 1.5 Mile Removal Action - First Phase,* by Weston, (November 2001) and the Water Treatment Design Submittal (May 10, 2002) and corresponding USACE approval letter, I grant to you, pursuant to 40 CFR 122.3(d), an exclusion from the requirement for a Permit under the National Pollutant Discharge Elimination System (NPDES), in order that contaminated sediments and soils may be excavated from the Housatonic River and riverbank.

Subject to other controls of the State of Massachusetts and the City of Pittsfield, you are authorized to discharge up to 500 gallons of treated water per minute from a treatment system consisting of two 150,000 gallons modutanks, leading to an oil/water separator, then through bag filters, sand filters and through an activated carbon treatment phase (sized appropriately for the anticipated flow), and discharging into the Housatonic River. Operations must be conducted in accordance with the following conditions:

1. No discharge of oil, sufficient to cause a sheen (as defined in 40 CFR 112), occurs to the Housatonic River. The discharge of a sheen of oil constitutes an oil spill and must be reported immediately to the National Response Center [(800) 424-8802], USACE, DEP (Emergency Response), and EPA.

2. Security provisions are maintained to assure that system failure, vandalism, or other incident will be addressed in a timely fashion, preventing the loss of oil or contaminated water to the receiving waters.

3. Sampling and analysis, in accordance with EPA methods and the project QAPP/FSP, shall be performed for the compounds listed below. The corresponding effluent limits are also given below:

Parameter		CAS Registry #	Limit (ppb)
1.	Acetone	67-64-1	100 (1)
2.	2-Butanone	78-93-3	100 (1)
3.	Chlorobenzene	08-90-7	100
4.	Toluene	108-88-3	*
5.	Bis(2-ethylhexyl) phthalate	117-81-7	100 (1)
6.	Barium	7440-39-3	100
7.	Beryllium	7440-41-7	4
8.	Chromium	7440-47-3	100
9.	Cobalt	7440-48-4	100 (1)
10.	Copper	7440-50-8	100 (1)
11.	Lead	7439-92-1	50
12.	Vanadium	7440-62-2	100 (1)
13.	Zinc	7440-66-6	100 (1)
14.	Tin	7440-31-5	100 (1)
15.	PCBs	1336-36-3	0.5
16.	Benzene	71-43-2	5 (*)
17.	Chloroform	67-66-3	100
18.	Cis-1,2-Dichloroehtylene	156-59-2	70
19.	Trichloroethylene	79-01-6	5
20.	Diethyl phthalate	84-66-2	100 (1)
21.	Phenol	108-95-2	100 (1)
22.	Arsenic	7440-38-2	50
23.	Nickel	7440-02-0	100
24.	Thallium	7440-28-0	2
25.	1,3-dichlorobenzene	541-73-1	100 (2)
26.	1,4-dichlorobenzene	106-46-7	100 (2)
27.	1,2-dichlorobenzene	95-50-1	75
28.	1,2,4,-Trichlorobenzene	120-82-1	70
29.	1,2,4,5-Tetrachlorobenzene	95-94-3	100 (1)
30.	Pentachlorobenzene	608-93-5	100 (1)
31.	Ethyl Benzene	100-41-4	*
32.	Xylene(s)	1330-20-7	*
33.	Tert-Butyl methyl ether (MBTE)	1634-04-4	70
34.	PAHs	Various	100 (3)
35.	Total petroleum hydrocarbons	N/A	5,000

Notes:

*Total BTEX cannot exceed 100 ppb, Benzene cannot exceed 5 ppb.

(1) Limit is based on agreement with MA DEP that no limit for a contaminant will exceed 100

ppb in an emergency exclusion.
(2) Limit lowered to 100 ppb to meet exclusion criteria.
(3) Limit is 100 ppb for each individual PAH.

Sampling and analysis of the influent to carbon treatment and between carbon units, if in series, and the effluent to the Housatonic River are to be performed every other day, during the first week of operations, weekly for the balance of the first month, and once every other week for the balance of the dewatering activity. Sampling between the carbon cells can consist of a composite sample and the required analysis is limited to organic compounds.

Monthly analytical reports, with quality control information, shall be submitted to the USACE and EPA by the 28th of the month. EPA and the USACE shall be notified immediately of any exceedances. If there are any exceedances, appropriate corrective actions as determined in consultation with EPA and the USACE, shall be implemented.

A summary of all of the analytical data (unvalidated) shall be included 1.5 Mile Reach Monthly Reports.

4. You or your representative shall provide 24 hours notice of system start-up.

5. Discharge to the river shall be such that the 500 gpm flow does not result in scouring of the river bed or riverbank.

6. EPA and the USACE shall be notified prior to operating the carbon cells in parallel.

This exclusion will be in effect until the completion of the 1.5 Mile Reach Removal Action or until otherwise notified by EPA.

If any questions should arise, please do not hesitate to contact me at (413) 236-0969.

Sincerely,

Dean Tagliaferro
On-Scene Coordinator

cc: S. Steenstrup, MA DEP
D. Moore, USACE
H. Inglis, EPA
Mayor Hathaway, City of Pittsfield

DIVISION 15—MECHANICAL

SECTION 15064

PLASTIC PIPE

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

HOUSATONIC RIVER BYPASS GRAVITY FLOW SYSTEM - Section 11000.

1.2 SCOPE

a. The supplier shall furnish to the construction site all pipe, labor, materials, tools, and equipment necessary for the satisfactory fabrication and fusion welding of plastic pipe and fittings as shown on the Drawings and as specified.

b. Two complete 1,400-foot lengths (2,800 linear feet) of high-density polyethylene pipe, 54 inches outside diameter (OD). Dimensional ratio (DR) 21 approximately 2.5-inch wall.

1.3 INSPECTION AND TESTING

a. The quality of all materials, the process of manufacture and piping in place shall be subject to inspection and approval of the Owner. Pipe may be inspected at the place of manufacture and on the Work. Pipe shall be subject to rejection at any time even though submitted samples may have been approved. In addition, the Owner reserves the right to have any or all pipe or fittings inspected or tested, or both, by an independent inspection service at either the manufacturer's plant of elsewhere. Such inspection and/or tests shall be at the Owner's expense.

b. All pipe, fittings and appurtenances shall be carefully inspected in the field before installation. All pieces found to be defective, as determined by the Owner, shall be pulled out and not installed. Such rejected pipe shall be clearly tagged in such a manner as not to deface or damage it, and the pipe shall then be removed from the job site by the Contractor at his own expense. Results of shop tests which are required in the Specifications shall be submitted to the Owner prior to installation of the pipe for which such tests were ordered.

1.4 HANDLING OF PIPE AND FITTINGS

a. All pipe and fittings shall be carefully shipped and handled by equipment of sufficient capacity and proper design to avoid damage to the pipe and fittings.

Under no circumstances shall materials be dropped or dumped. Pipe and fittings shall be stored in such a manner as to be protected and kept clean and dry.

1.5 QUALITY ASSURANCE

a. Each length of pipe shall be marked by manufacturer with the trade name, nominal size, material designation, and class.

b. Couplings and fittings shall be marked by the manufacturer with the trade name, nominal size, material designation and class.

c. The manufacturer shall have manufacturing and quality assurance facilities capable of producing and assuring the quality of the pipe and fittings required by these Specifications. The manufacturer's production facilities shall be open for inspection by the Owner or his Authorized Representative. The Project Engineer shall approve qualified manufacturers.

PART 2 PRODUCTS

2.1 GENERAL

a. Plastic pipe shall meet the minimum strength requirements for the type and/or class specified. Pipe and fittings shall conform to the specifications of the latest ASTM standards.

2.2 HIGHT DENSITY POLYETHELE PIPE, FITTINGS AND JOINTS

a. Pipe shall be equivalent to Driscoplex 4100 PE 3408, ASTM D3350 cell classification 345464c with standard HDB rating of 1600 PSI at 73°F.

b. Pipe shall be delivered to the site in 50-foot lengths and fusion welded.

c. Polyethylene Fittings & Custom Fabrications. Polyethylene fittings and custom fabrications shall be molded or fabricated by the approved pipe manufacturer. All fittings and custom fabrications shall be pressure rated for the same internal pressure rating as the mating pipe.

d. Molded Fittings. Molded fittings shall be manufactured and tested in accordance with ASTM D 3261 and shall be so marked. Molded fittings shall be tested in accordance with AWWA C906.

e. Fabricated Fittings. Fabricated fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock or molded fittings. Fabricated fittings shall be rated for internal pressure service at least

equal to the full service pressure rating of the mating pipe. Fabricated fittings shall be tested in accordance with AWWA C906.

f. Polyethylene Flange Adapters. Flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion-joining machine without the use of a stub-end holder. The sealing surface of the flange adapter shall be machined with a series of small V-shaped grooves (serrations) to promote gasketless sealing, or restrain the gasket against blowout.

g. Back-up Rings & Flange Bolts. Flange adapters shall be fitted with back-up rings that are pressure rated equal to or greater than the mating pipe. The back-up ring bore shall be chamfered or radiused to provide clearance to the flange adapter radius. Flange bolts and nuts shall be Grade 3 or higher.

PART 3 EXECUTION

3.1 GENERAL

a. Pipe and fittings shall be jointed in accordance with the recommendations of the latest ASTM standards and the manufacturers requirements.

3.2 JOINING

a. Pipe and fittings shall be thoroughly cleaned before they are placed. Ends of pipe, the inside of sleeve and any rubber rings shall be wiped clean and any burrs removed immediately before jointing the pipes.

b. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. The entrance of earth into pipe will not be permitted, and the Owner may require the placing of a heavy canvas bag of suitable size over each end of the pipe before it is lowered into the trench. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe.

c. Heat Fusion Joining. Joints between plain end pipes and fittings shall be made by butt fusion. Joints between the main and saddle branch fittings shall be made using saddle fusion. The butt fusion and saddle fusion procedures used shall be procedures that are recommended by the pipe and fitting manufacturer. The supplier shall ensure that persons making heat fusion joints have received training in the manufacturer's recommended procedure. The supplier shall maintain records of trained personnel, and shall certify that training was received not more than 12 months before commencing construction. External and internal beads shall be not removed.

d. Heat Fusion Training Assistance. Upon request and at the requestor's expense, training personnel from the manufacturer or his representative shall be made available.

e. Joining by Other Means. Polyethylene pipe and fittings may be joined together or to other materials by means of (a) flanged connections (flange adapters and back-up rings), (b) mechanical couplings designed for joining polyethylene pipe or for joining polyethylene pipe to another material, or (c) electrofusion. When joining by other means, the installation instructions of the joining device manufacturer shall be observed.

f. ID Stiffener and Restraint. A stiffener shall be installed in the bore of the polyethylene pipe when an OD compression mechanical coupling is used and when connecting plain end PE pipe to a mechanical joint pipe, fitting or appurtenance. External clamp and tie rod restraint shall be installed where PE pipe is connected to the socket of a mechanical joint pipe, fitting or appurtenance except where an MJ Adapter is used.

g. Branch Connections. Branch connections to the main shall be made with saddle fittings or tees. Polyethylene saddle fittings shall be saddle fused to the main pipe per Item c.

PART 4 TESTING

a. Fusion Quality. The supplier shall ensure the field set-up and operation of the fusion equipment, and the fusion procedure used by the supplier fusion operator while on site. Upon request by the Engineer, the supplier shall verify field fusion quality by making and testing a trial fusion. The trial fusion shall be allowed to cool completely; then test straps shall be cut out and bent strap tested in accordance with ASTM D 2657. If the bent strap test of the trial fusion fails at the joint, the field fusions represented by the trail fusion shall be rejected. The supplier at his expense shall make all necessary corrections to equipment, set-up, operation and fusion procedure, and shall re-make the rejected fusions.

END OF SECTION

ATTACHMENT 1

PROJECT ARARs TABLES

Table 1-1

Chemical-Specific ARARs

Regulation	Citation	Criterion/Standard	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
Federal ARARs				
Clean Water Act, Ambient Water Quality Criteria	33 USC 1314 40 CFR 131.36(b)(1) 63 Fed. Reg. 68359	National recommended criteria for surface water quality. PCB Criteria: For protection of freshwater aquatic life due to chronic exposure: 0.014 ppb For protection of human health from consumption of water and organisms: 0.00017 ppb Various numerical criteria for other constituents.	Relevant and appropriate for in-stream evaluation.	Removal of contaminated banks and sediments, together with the Removal Action for ½-Mile Reach and source control and floodplain soil removal performed pursuant to the Removal Actions Outside the River, should mitigate any existing PCB AWQC exceedances and reduce any PCB surface water contamination.
State ARARs				
Mass. Water Quality Standards	314 CMR 3.10(3) 314 CMR 4.05(5)(e)	Establishes federal water quality criteria as allowable water quality concentrations. Allows for site-specific criteria where federal criteria are invalid due to site-specific characteristics.	Relevant and appropriate for in-stream evaluation.	See above discussion of federal water quality criteria.

Table 1-1

Chemical-Specific ARARs
(Continued)

Regulation	Citation	Criterion/Standard	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
Guidances Considered				
Cancer Slope Factors (CSFs)	---	Guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	To be considered.	EPA considered this guidance in the development of this Removal Action.
Reference Doses (RfDs)	---	Guidance values used to evaluate the potential noncarcinogenic hazard caused by exposure to contaminants.	To be considered.	EPA considered this guidance in the development of this Removal Action.
PCBs: Cancer Dose - Response Assessment and Application to Environmental Mixtures	EPA/600/P-96/001F (September 1996)	Guidance regarding EPA's reassessment of the carcinogenicity of PCBs. It includes revised cancer slope factors for PCBs based upon the exposure pathway.	To be considered.	EPA considered this guidance in the development of this Removal Action.

Table 1-2

Action-Specific ARARs

Regulation	Citation	Criterion/Standard	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
A. Excavation of Bank Soils and River Sediments (including river diversion to re-route river) and Covering/Restoration of Excavated Areas				
Federal ARARs				
TSCA Regulations re PCB Remediation Waste	40 CFR 761.61(c)	Establishes cleanup options for PCB remediation waste, including PCB-contaminated soils and sediments. Options include risk-based approval by U.S. EPA. Risk-based approval option must demonstrate that cleanup plan will not pose an unreasonable risk of injury to health or the environment.	Applicable.	Will be attained. The EE/CA work will not pose an unreasonable risk of injury to health or the environment.
TSCA Regulations re Decontamination	40 CFR 761.79	Establishes decontamination standards and procedures for removing PCBs from non-porous surfaces.	Applicable to decontamination of equipment and sheetpiling used in excavation and restoration activities.	Will be attained.

Table 1-2

Action-Specific ARARs
(Continued)

Regulation	Citation	Criterion/Standard	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
A. Excavation of Bank Soils and River Sediments (including river diversion to re-route river) and Covering/Restoration of Excavated Areas (cont'd)				
Federal ARARs (cont'd)				
RCRA Hazardous Waste Regulations (Identification and Listing of Hazardous Wastes; Toxicity Characteristics)	40 CFR 261.24	Identifies concentration of contamination which, if present, make a waste hazardous due to toxicity. The analytical test set forth in Appendix II of 40 CFR part 261 is referred to as the Toxicity Characteristic Leaching Procedures.	Relevant and Appropriate.	Will be attained. After application of a conservative screening test, if exceedances are suspected, TCLP will be used to determine whether soils and sediments are characteristic hazardous waste. Soils that exceed allowable concentrations will either be placed in the appropriate On-Plant Consolidation Area (e.g., Building 71) or sent to an appropriate off-site disposal facility. Soils below allowable concentrations, as determined either through the screening tool or TCLP testing, will either be placed in the Hill 78 or Building 71 Consolidation Areas or sent to an appropriate off-site facility.

Table 1-2

Action-Specific ARARs
(Continued)

Regulation	Citation	Criterion/Standard	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
A. Excavation of Bank Soils and River Sediments (including river diversion to re-route river) and Covering/Restoration of Excavated Areas (cont'd)				
Federal ARARs (cont'd)				
Clean Water Act NPDES Regulations (Stormwater Discharges)	40 CFR 122.26(c)(1) (ii)(C) 40 CFR 122.44(k) 40 CFR 125.100-.104	Best management practices to control pollutants in stormwater discharges during construction activities.	Applicable.	Best management practices for erosion and sedimentation control will be adopted to minimize the potential for rainfall or flood-induced migration of soils and sediments from disturbed areas.
State ARARs				
Mass. Air Pollution Control Requirements	310 CMR 7.09	Prohibition against creating condition of air pollution in connection with dust-generating activity.	Applicable.	Will be attained. Air monitoring for particulates will be conducted and any exceedances will be addressed.

Table 1-2

Action-Specific ARARs
(Continued)

Regulation	Citation	Criterion/Standard	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
B. Discharge of Treated Waters to Housatonic River				
Federal ARARs				
Clean Water Act, NPDES Regulations	33 USC 1342 40 CFR 122, esp. 122.44(a), (e) 40 CFR 125.1-125.3	Best Available Technology (BAT) effluent limits for toxic and non-conventional pollutants; Best Conventional Technology (BCT) limits for conventional pollutants; water-quality based effluent limitations. Discharges in accordance with instructions of On-Scene Coordinator acting pursuant to NCP are exempt from NPDES permit requirements. See 40 CFR 122.3(d).	Applicable to point source discharges of treated waters to Housatonic River.	Will be attained. The discharge of treated waters will be from a portable treatment plant that will meet the requirements of the NPDES exclusion permit issued to Weston by EPA on September 20, 2002, or will be from GE's existing Groundwater Treatment facility, in which case discharges will meet GE's NPDES permit limits.
	40 CFR 125.100-.104	Best management practices to prevent release of toxics to surface water from ancillary areas or spills.	Same as above.	Same as above.

Table 1-2

Action-Specific ARARs
(Continued)

Regulation	Citation	Criterion/Standard	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
B. Discharge of Treated Waters to Housatonic River (cont'd)				
Federal ARARs (cont'd)				
TSCA Regulations	40 CFR 761.50(a)(3)	Prohibits discharge of water containing PCBs to navigable waters unless PCB concentration is less than approximately 3 ppb or in accordance with discharge limits of NPDES permit.	Relevant and Appropriate to discharge of treated waters to Housatonic River.	Will be attained. See discussion of federal Clean Water Act NPDES regulations above.
State ARARS				
Mass. Clean Water Act - Discharge Regulations and Water Quality Standards	314 CMR 3.10 314 CMR 3.19 314 CMR 4.04 (1) 314 CMR 4.05(3)(b) 314 CMR 4.05(5)	Effluent limitations and other conditions for point source discharges; state water quality standards.	Applicable to point source discharges of treated waters to Housatonic River.	For effluent discharges, see discussion of federal Clean Water Act NPDES regulations above. For in-stream attainment, see Table 1-1.

Table 1-2

Action-Specific ARARs
(Continued)

Regulation	Citation	Criterion/Standard	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
C. Temporary On-Site Storage/Accumulation of Excavated Sediments and Soils and Temporary On-Site Storage/Accumulation of Free Product, Drums, and Equipment that Will be Disposed of Off-Site.				
Federal ARARs				
TSCA Regulations (Storage for Disposal)	40 CFR 761.61(c)	Provides for risk-based approval to store PCB-remediation waste based upon demonstration that storage plan will not pose an unreasonable risk of injury to health or the environment.	Applicable.	Will be attained. Temporary storage areas will be lined with synthetic material or will be placed within a building with a suitable floor (e.g., pavement, concrete, etc.). Outdoor storage areas will be covered with impermeable material. Temporary storage requirements for marking and inspections will be met.
TSCA Regulations (PCB Marking Requirements)	40 CFR 761.40	Requirements regarding the marking of PCB containers and PCB storage areas.	Applicable.	Will be attained.

Table 1-2

Action-Specific ARARs
(Continued)

Regulation	Citation	Criterion/Standard	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
C. Temporary On-Site Storage/Accumulation of Excavated Sediments and Soils and Temporary On-Site Storage/Accumulation of Free Product, Drums, and Equipment that Will be Disposed of Off-Site (cont'd)				
Federal ARARs (cont'd)				
RCRA Hazardous Waste Regulations (Storage of Hazardous Waste)	40 CFR Part 264, Subparts I and J 40 CFR 262.34(a).	Subparts I and J of Part 264 identify design, operating, monitoring, closure, and post-closure care requirements for long-term storage of RCRA hazardous waste in containers and tank systems, respectively. However, Section 262.34(a) allows accumulation of RCRA hazardous wastes for up to 90 days in containers or tanks provided generator complies with requirements of Subparts I and J of Part 265.	Applicable.	Will be attained. Any free product, drums, or contaminated equipment will be managed and stored in accordance with the substantive requirements of the cited regulations prior to being sent off-site for disposal.

Table 1-2

Action-Specific ARARs
(Continued)

Regulation	Citation	Criterion/Standard	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
C. Temporary On-Site Storage/Accumulation of Excavated Sediments and Soils and Temporary On-Site Storage/Accumulation of Free Product, Drums, and Equipment that Will be Disposed of Off-Site (cont'd)				
State ARARs				
Mass. Hazardous Waste Regulations (Storage of Hazardous Waste)	310 CMR 30.680, 30.690 310 CMR 30.340	Sections 30.680 and 30.690 identify requirements for long-term storage of RCRA hazardous waste in containers and tank systems similar to federal RCRA storage requirements identified above. Section 30.340 allows on-site accumulation of hazardous waste for up to 90 days and is also similar to federal RCRA storage requirements identified above.	Applicable to the accumulation and storage of Mass. Hazardous waste (other than PCBs).	See discussion of federal RCRA Hazardous Waste Regulations above.

Table 1-2

Action-Specific ARARs
(Continued)

Regulation	Citation	Criterion/Standard	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
D. Permanent On-Site Consolidation of Excavated Sediments and Soils				
ARARs are listed in EPA approved Supplemental Addendum (dated September 8, 1999) to GE *Detailed Work Plan for On-Plant Consolidation Areas*.				

Table 1-2

Action-Specific ARARs
(Continued)

Regulation	Citation	Criterion/Standard	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
E. Other				
Federal ARARs				
TSCA PCB Spill Cleanup Policy	40 CFR 761, Subpart G (§761.120 et seq.)	Policy used to determine adequacy of cleanup of spills resulting from the release of materials containing PCBs at concentration of 50 ppm or greater.	TBC for PCB spills or leakage from cleanup.	This cleanup policy will be considered for any new PCB spills that occur during the work.

Table 1-3

Location-Specific ARARs

Regulation	Citation	Requirements	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
Federal ARARs				
Fish & Wildlife Coordination Act Requirements	16 USC 662, 663 40 CFR 6.302(g)	Requires consultation with appropriate agencies to protect fish and wildlife when federal actions may alter waterways. Must develop measures to prevent and mitigate potential loss to the maximum extent possible.	Applicable.	Will be attained. Appropriate agencies will be consulted regarding potential mitigation measures. In-stream work includes restoration of river and aquatic habitat and precautions against erosion and scour of river sediments and bank soils.
Preservation of Historical and Archaeological Data Act and National Historic Preservation Act	16 USC 469 et seq. 36 CFR Part 65 16 USC 470 et seq. 36 CFR Part 800	Establishes requirements for the recovery and preservation of historical and archaeological data. Also requires measures to minimize harm to historic resources.	Potentially applicable.	No archaeological or historic resources are believed to exist in the 1.5 Mile Reach. This assumption was verified (see attachment of State Register of Historic Places, 1998, pages 213-214). If historic or archaeological resources are discovered, such objects will be recovered in accordance with the substantive requirements of the cited regulations, to the extent practicable. If historic properties are identified, mitigation measures will be taken to minimize harm to historic properties, to the extent practicable.

Table 1-3

Location-Specific ARARs
(Continued)

Regulation	Citation	Requirements	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
Federal ARARs (cont'd)				
Endangered Species Act	16 USC 1531 et seq. 50 CFR Part 402 50 CFR Part 17.11-17.12 40 CFR 6.302(h)	This Act requires action to avoid jeopardizing the continued existence of listed endangered or threatened species or destruction or adverse modification of critical habitat. Also must consult with Department of Interior.	Potentially applicable.	Threatened or endangered species are not believed to exist in the 1.5 Mile Reach. This assumption was verified; see attached letter from John Lorties of Woodlot Alternatives, Inc. to Joel Lindsay of Roy F. Weston, Inc. dated October 19, 2001. If endangered species are present, substantive provisions of the cited regulation will be complied with, to the extent practicable.
Executive Order for Wetlands Protection	Exec. Order 11990 (1977) 40 CFR 6.302(a) 40 CFR Part 6, App. A	Federal agencies are required to avoid adversely impacting wetlands whenever possible, minimize wetland destruction, and preserve the value of wetlands.	Applicable.	Will be attained. There is no practical alternative to work in wetlands with less adverse impact and all practicable measures will be taken to minimize and mitigate any adverse impacts. Erosion and sedimentation control measures will be adopted during removal and restoration activities. The riverbank, river, and associated habitat will be restored and enhanced.

Table 1-3

Location-Specific ARARs
(Continued)

Regulation	Citation	Requirements	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
Federal ARARs (cont'd)				
Executive Order for Floodplain Management	Exec. Order 11988 (1977) 40 CFR Part 6, App. A. 40 CFR 6.302(b)	Federal agencies are required to reduce the risk of flood loss, minimize impact of floods, and restore and preserve the natural and beneficial values of floodplains.	Applicable.	Will be attained. There is no practical alternative to work in floodplains with less adverse impact and all practicable measures will be taken to minimize and mitigate any adverse impacts. Erosion and sedimentation control measures will be adopted during removal and restoration activities. The riverbank, river, and associated habitat will be restored and enhanced.
Clean Water Act § 404 Requirements	33 USC 1344 33 CFR Parts 320-323 40 CFR 230	For discharge of dredged or fill material into water bodies or wetlands, there must be no practical alternative with less adverse impact on aquatic ecosystem; discharge cannot cause or contribute to violation of state water quality standard or toxic effluent standard or jeopardize threatened or endangered (T&E) species; discharge cannot significantly degrade waters of U.S.; must take practicable steps to minimize and mitigate adverse impacts; must evaluate impacts on flood level, flood velocity, and flood storage capacity.	Applicable.	Will be attained in part because (a) there is no practical alternative with less adverse impact; (b) all practical measures will be taken to minimize and mitigate any adverse impacts from the work; (c) there is no likely impact on T&E species; (d) actions will be taken to minimize impact of hydrologic changes during the work; (e) after completion of the work, there will be no significant net loss of flood storage capacity, and no significant net increase in flood stage or velocities; and (f) river and riverbanks will be restored and habitat will be improved.

Table 1-3

Location-Specific ARARs
(Continued)

Regulation	Citation	Requirements	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
State ARARs				
Mass. Clean Water Act - Water Quality Certification Regulations	314 CMR 9.06	For discharge of dredged or fill material, there must be no practicable alternative with less adverse impact on aquatic ecosystem; must take practicable steps to minimize adverse impacts on wetlands or land under water; stormwater discharges must be controlled with BMPs; must be no substantial adverse impact to physical, chemical, or biological integrity of surface waters.	Relevant and Appropriate.	Will be attained because (a) there is no practicable alternative with less adverse impact on the aquatic ecosystem; (b) all practical measures will be taken to minimize adverse impacts on wetlands and land under water; (c) stormwater discharges will be controlled through BMPs; and (d) there will be no substantial long-term adverse impacts to integrity of river waters.
	314 CMR 9.07	Hydraulic or mechanical dredging allowed; must avoid fisheries impacts.	Relevant and Appropriate.	Will be attained. There are no significant fisheries in area at present and aquatic habitat will be restored.
Mass. Wetlands Protection Regulations Regarding Endangered Species	310 CMR 10.59	Actions must be conducted in a manner that minimizes the impact on Massachusetts listed rare, threatened, or endangered species, and species listed by the Massachusetts Natural Heritage Program.	Potentially Applicable.	Threatened or endangered species are not believed to exist in the 1.5 Mile Reach. This assumption was verified; see attached letter from John Lortie of Woodlot Alternatives, Inc. to Joel Lindsay of Roy F. Weston, Inc. dated October 19, 2001. If endangered species are present, substantive provisions of the cited regulation will be complied with, to the extent practicable.

Table 1-3

Location-Specific ARARs
(Continued)

Regulation	Citation	Requirements	Applicability/Appropriateness	Actions to be Taken to Attain ARARs
State ARARs (cont'd)				
Mass. Historical Commission Act and Regulations	MGL c. 9 § 27C 950 CMR 71.07	Adoption of prudent and feasible measures to eliminate, minimize, and mitigate impacts on historic properties.	Potentially Relevant and Appropriate.	No historic resources are believed to exist in the 1.5 Mile Reach. This assumption was verified (see attachment of the State Register of Historic Places, 1998, pages 213-214). If historic data are discovered, such objects will be recovered in accordance with the substantive requirements of the cited regulations, to the extent practicable. Mitigation measures will be taken to minimize harm to historic properties, to the extent practicable.
Mass. Wetlands Protection Act and Regulations	MGL c. 131 § 40 310 CMR 10.00	Regulations restrict dredging, filling, altering, or polluting inland wetland resource areas and impose performance standards for work in such areas. Protected resource areas include: 10.54 (Bank); 10.55 (Bordering Vegetated Wetlands); 10.56 (Land under Water); 10.57 (Bordering Land subject to Flooding); and 10.58 (Riverfront Area).	Applicable.	Will be attained because (a) there is no practicable alternative that would be less damaging to resource areas; (b) all practical measures will be taken to minimize adverse impacts on wetlands; (c) stormwater discharges will be controlled through best management practices (BMPs); (d) actions will be taken to minimize impact of hydrologic changes during the work to the extent practicable; (e) after completion of the work, there will be no significant net loss of flood storage capacity and no significant net increase in flood storage or velocities; and (f) disturbed vegetation, river, and riverbank will be restored.

ATTACHMENT 2

LETTER REGARDING ABSENCE OF THREATENED AND ENDANGERED SPECIES IN THE 1 ½-MILE REACH

WOODLOT
ALTERNATIVES, INC.
ENVIRONMENTAL CONSULTANTS

RECEIVED
OCT 29 2001
BY:.....

October 19, 2001

Joel Lindsay
R.F Weston, Inc.
1 Wall Street
Manchester, NH 03101-1501

RE: Absence of Threatened and Endangered Species in the 1 ½ Mile Reach

Dear Joel:

Woodlot Alternatives, Inc. has not observed any Threatened or Endangered (T&E) species in the 1 ½ Mile Reach. In this letter I briefly describe the process we used to search for T&E species in the 1 ½ Mile Reach, and refer to other documents that have been prepared supporting our observations.

T&E species are those plants or animals identified by either the State of Massachusetts Natural Heritage and Endangered Species Program (MNHESP) or the United States Fish and Wildlife Service that are in danger of extinction throughout all or part of their range, or are likely to become endangered in the foreseeable future. Lists and descriptions of federally listed and Massachusetts-listed T&E species can be found at http://www.state.ma.us/dfwele/dfw/nhesp/nhrare.htm.

Before performing field surveys, we collected and reviewed available information on T&E species from the MNHESP to see if there were any known occurrences in or near the 1 ½ Mile Reach. There were no known sites in the Reach, but there were some downstream that contained black maple (*Acer nigrum*), foxtail sedge (*Carex alopecoidea*), Gray's sedge (*Carex grayi*), bur oak (*Quercus macrocarpa*), bristly crowfoot (*Ranunculus pennsylvanicus*), eastern black currant (*Ribes americanum*), wapato (*Sagittaria cuneata*), hoary willow (*Salix candida*), culver's root (*Veronicastrum virginicum*), American bittern (*Botarus lentiginosus*), bald eagle (*Haliaeetus leucocephalus*), and the common moorhen (*Gallinula chloropus*). Information on T&E species that could occur in or near the 1 ½ Mile Reach can be found in the *Housatonic River Ecological Characterization Report - Preliminary* (TechLaw, Inc., February 4, 1999).

We reviewed the life history characteristics and habitat preferences for each of these species to determine if there was potentially suitable habitat present in the 1 ½ Mile Reach. This was done by reviewing published technical literature, information from occurrence records at the MNHESP, aerial photos of the project area, and by our familiarity with most of these species. We next reviewed habitat found in the 1 ½ Mile Reach during on-site surveys to see if there are any T&E species present, or potential habitat for T&E species. We did not observe any T&E species, and because of the large amount of historical habitat alteration and existing development, it is unlikely that any T&E species occur in this area. Information on the habitat found in the 1 ½ Mile Reach is contained in Appendix K of the *Final Draft, Engineering Evaluation/Cost Analysis for the Upper Reach of the Housatonic River* (Roy F. Weston, Inc., February 11, 2000).

Sincerely,
Woodlot Alternatives, Inc.

John P. Lortie
President

122 MAIN STREET NO. 3, TOPSHAM, MAINE 04086 PHONE: 207-729-1199 FAX: 207-729-2715
E-mail: mail@woodlotalt.com Web Site: http://www.woodlotalt.com

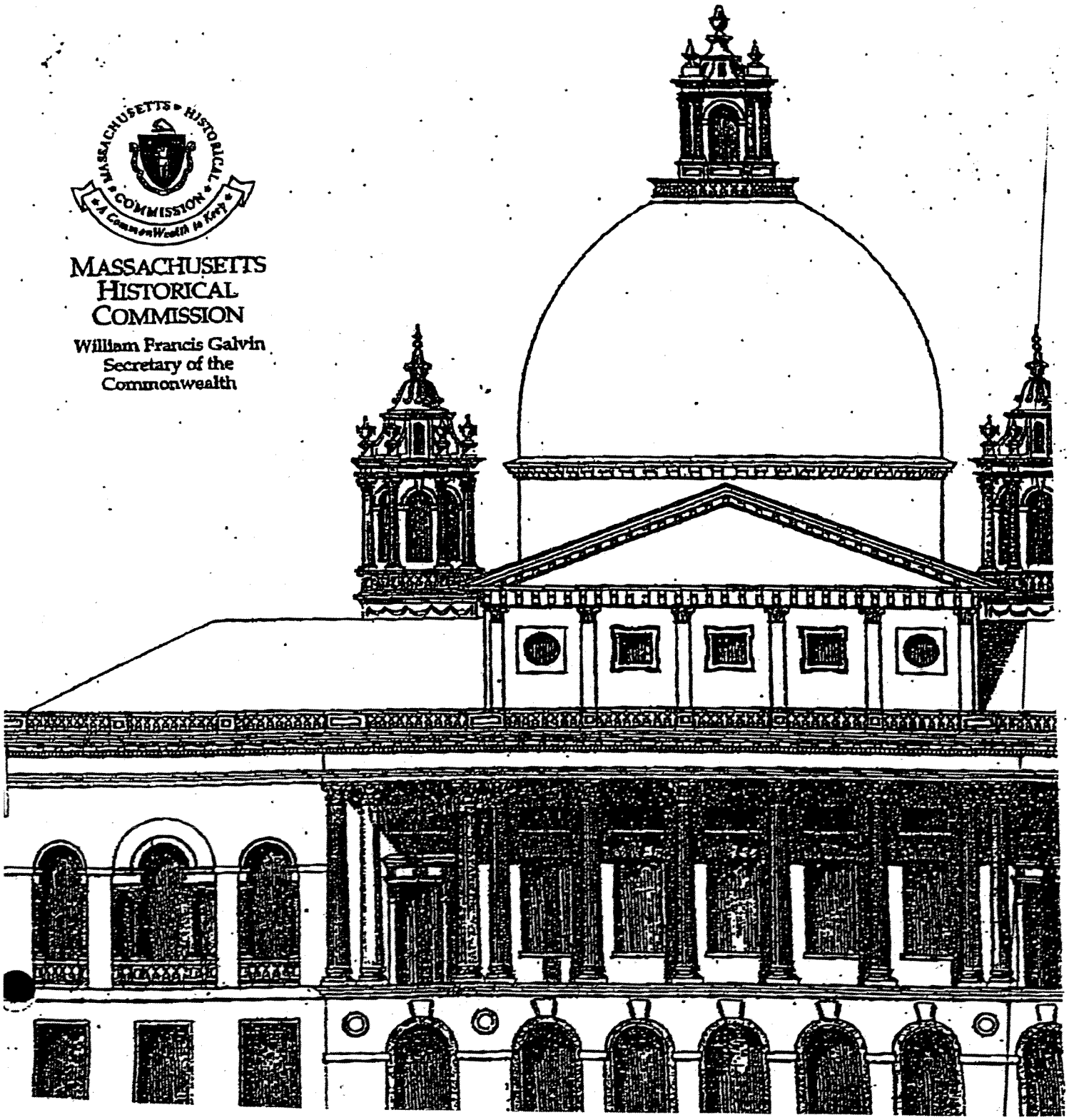
ATTACHMENT 3

STATE REGISTER OF HISTORIC PLACES

STATE REGISTER OF HISTORIC PLACES 1998

MASSACHUSETTS HISTORICAL COMMISSION

William Francis Galvin
Secretary of the Commonwealth



Town/Name/Address	Designation	Date	# Props
Petersham (cont.)			
Petersham Common Historic District Common, North and South Main and North Sts and Athol Rd	NRDIS	05/18/1982	45
Petersham Craft Center 8 North Main St	NRDIS PR Exp:	05/18/1982 10/02/1995	1 1
Petersham Historic District Common, North and South Main and North Sts and Athol Rd	LHD NRDIS	04/27/1966 05/18/1982	29 29
Prescott Town House Rt 32	NRIND	02/21/1989	1
Phillipston			
Massachusetts State Hospitals and State Schools Multiple Property Submission, 14 districts and one DOE in 19 towns	NRMPS	01/21/1994	12
Templeton Farm Colony (Phillipston/Templeton) Mass. State Hospitals and State Schools MPS, 126 Royalston Rd, Templeton	NRDIS NRMPS	01/21/1994 01/21/1994	12 12
Pittsfield			
Allen Hotel Wendell Ave Extension	NRIND NRDIS	09/01/1983 12/23/1991	1 1
Allen, William Russell House 359 East St	NRIND	05/07/1980	1
Berkshire Life Building 5-7 North St	NRIND NRDIS	02/27/1986 12/23/1991	1 1
Bush - Melville House (Arrowhead) 780 Holmes Rd	NHL PR Exp:	10/15/1966 05/30/1996	1 1
Eaton, Crane and Pike Company Factory 75 South Church St	NRDIS	08/03/1990	9
First Baptist Church 88 South St	NRDIS PR Exp:	12/23/1991 09/22/1998	1 1

Town/Name/Address	Designation	Date	# Prop
Pittsfield (cont.)			
First Church of Christ 27 East St	NRDIS PR Exp:	07/24/1975 02/25/1998	1 1
Hancock Shaker Village (Hancock/Pitsfield) Lebanon Mount Rd	MA/HL NRDIS NHL PR Exp: 02/10/2007	04/01/1966 11/24/1968 11/24/1968 02/10/1977	3 3 3 3
Morewood School South Mountain Rd	PR Exp: NRIND	05/16/1984 05/31/1984	1 1
North Street Commercial Block 15-83 North St	NRDOE	12/06/1978	4
Old Central Fire Station 66 Allen St	NRIND NRDIS PR Exp:	01/02/1977 12/23/1991 07/02/1998	1 1 1
Old Central High School First St	NRIND	08/06/1980	1
Park Square Historic District (See also Boundary Increase) At the intersection of North, South, East and West Sts	NRDIS	07/24/1975	11
Park Square Historic District (Boundary Increase) Roughly bounded by East Housatonic, South, North and Penn Sts and Wendell Ave	NRDIS	12/23/1991	49
Pines Archeological Site	PR Exp:	01/28/1988	1
Pittsfield Town Hall 43 East St	NRIND NRDIS	04/26/1972 07/24/1975	1 1
Power, Charles Whittlesey House 575 South St	NRIND	08/08/1997	4
Providence Court 379 East St	NRIND	11/20/1987	1
South Mountain Concert Hall South St	NRIND NRDOE	08/14/1973 03/25/1985	1 1
Wollison - Shipton Building 152 North St	NRIND NRDIS	09/30/1982 12/23/1991	1 1