

**U.S. Army
Corps of Engineers**

New England District
Concord, Massachusetts

**SPECIFICATIONS FOR PHASE 3
STATIONS 543+50 TO 575+33
1.5-MILE REACH REMOVAL ACTION**

GE-123004-ACMJ

January 2005

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

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



Weston Solutions, Inc.
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27 January 2005

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

Work Order No. 20125.257.103.1720

Re: Contract No. DACW33-00-D-0006
1.5-Mile Reach Removal Action – Phase 3 Final Specifications
DCN: GE-123004-ACMJ

Dear Mr. Hugh:

Please find attached three sets of the Final Specifications for Phase 3 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 (9 copies)
- Holly Inglis, EPA (1 copy)
- Darrell Moore, USACE Pittsfield (4 copies)
- Ray Goff, USACE Chicopee (delivery to Pittsfield)

Copies of the drawing set for Phase 3 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.





Mr. Peter Hugh
U.S. Army Corps of Engineers

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27 January 2005

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

Very truly yours,

Weston Solutions, Inc.

A handwritten signature in cursive script that reads "Andrew Marcus" with the word "for" written below it.

Joel S. Lindsay
Task Manager

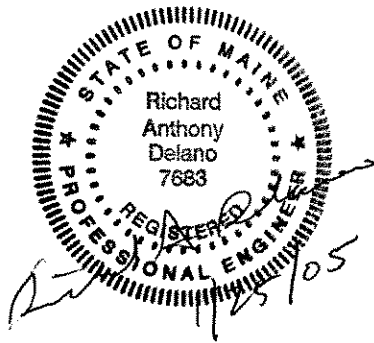
JSL/wp

Enclosure

cc: D. Tagliaferro (9 copies)
D. Moore (4 copies)
R. Goff
Sevenson (2 copies)
Woodlot (2 copies)
DCN Files

**Final Specifications for Phase 3
Stations 543+50 to 575+33
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,
10100, 11800**



**Weston Solutions, Inc.
Richard Anthony Delano, P.E.**

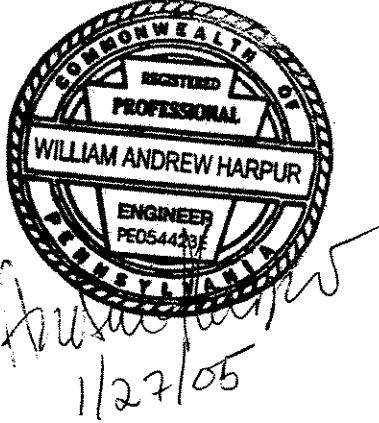
Specifications Sections: 11000, 15064



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

Final Specifications for Phase 3
Stations 543+50 to 575+33
1.5-Mile Reach Removal Action
Site-Specific Environmental Remediation Contract
General Electric (GE)/Housatonic River Project
Pittsfield, Massachusetts
Stamp Sheet

Specifications Section: 02300, 02382, 02450, 02464



Weston Solutions, Inc.
William Andrew Harpur, P.E.

**SPECIFICATIONS FOR PHASE 3,
STATIONS 543+50 TO 575+33,
1.5-MILE REACH REMOVAL ACTION**

Contract No. DACW33-00-D-0006
Task Order No. 0005
DCN: GE-123004-ACMJ

Prepared for

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

Prepared by

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January 2005

W. O. No. 20125.257.103.1720

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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 Phase 3 of a Removal Action within the 1.5-Mile Reach of the Housatonic River, to be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The design Drawings and Specifications generally cover Phase 3 excavation and backfilling/restoration from the Dawes Avenue Bridge to the confluence of the East and West Branches of the Housatonic River. The specific scope of work included in Section 01025 MEASUREMENT AND PAYMENT AND BID SCHEDULE is from Station 543+50 to Station 575+33. 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, the existing gravity bypass river diversion system and a proposed sheet pile river diversion system will be used for different reaches of Phase 3.

The existing river diversion system consists of a removable stop log dam; two 54-inch high-density polyethylene (HDPE) pipes; and associated valves, controls, and other appurtenances. For excavations occurring from Stations 543+50 to 547+50, the temporary dam installed at Station 514+00 will impound the river during relatively low flows (approximately 200 cfs as measured at the Coltsville U.S. Geological Survey [USGS] gauging station) and water will be conveyed through the 54-inch pipes. This work scope includes the operation and maintenance of these items and extension of the 54-inch HDPE pipes to accomplish the work. Currently, the 54-inch pipes extend approximately to Station 542+00 and will be extended approximately to Station 548+00. Pipe to accomplish this extension has already been procured and is staged on-site.

The temporary dam/piping system, including all necessary equipment and structures, will be operated and maintained by the Excavation Subcontractor. 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. Similarly, the Excavation Subcontractor shall install the sheet pile pile diversion system beginning at approximately Station 547+50 and extending throughout the remainder of Phase 3 to the confluence with the West Branch (Station 575+33). In general, each work cell or excavation will be segregated from the river both at the upstream and downstream ends by secondary, movable dams or sheet pile walls as necessary throughout

Phase 3. 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, ramps constructed of earth, concrete blocks, and large timbers or other suitable means will be used to allow equipment to cross the pipes. Similarly, sheet pile will be installed so that approximately half of the river is dewatered at any given time. Following remediation of the dewatering sheet pile cell, sidewalls will be lowered or removed and installed on the opposite side to complete remediation in the opposite half of the river. In general, when river flows exceed or are expected to exceed the capacity of the diversion system, excavation will be suspended, and the work areas will be secured and prepared for flooding. For the gravity diversion portion of the work, the temporary dam, or a portion of it, will be removed.

In general, soil and sediment will be excavated to a depth of 1 to 3 feet. Excavation will proceed according to the following classifications for disposal purposes: Toxic Substances Control Act [TSCA], non-TSCA, and non-TSCA requiring post-excavation sampling. Material will be excavated according to these classifications in layers of no less than 1-foot thickness as noted on the Drawings. Specific excavation depths for each area are indicated on the Drawings. In some residential areas, there are cuts as deep as 8 feet perpendicular to the river bank slope. 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, and restoration of the banks via replanting and installation of slope reinforcing structures will be conducted. Between Stations 543+50 and 547+50, riverbed habitat enhancement structure installation will not be conducted until the 54-inch pipes are removed from the river. This portion of the work (including all of Phase 2) is not included as part of this Scope of Work. Below Station 547+50, riverbed enhancement structures are included in this Scope of Work and shall be installed in each sheet pile cell enclosure as the work proceeds. Excavated materials will be segregated at the soil staging areas before disposal in accordance with their pre-excavation classification (TSCA or non-TSCA) or as non-TSCA requiring post-excavation sampling if pre-excavation classification had not been completed. TSCA materials will be disposed of on-site at the Building 71 Landfill. Non-TSCA materials will be disposed of on-site at the Hill 78 Landfill or re-characterized as necessary for off-site disposal. In general, work will proceed sequentially down the river, with each area being successively isolated, remediated, backfilled, and restored.

1.2 DIVISION OF WORK

The General Contractor for the work is Weston Solutions, Inc. (WESTON). WESTON has formed a team of subcontractors with differing specialties to accomplish the project. Table 01010-1 provides a breakdown of the major construction work tasks and entities that are expected to conduct them. WESTON and each of its subcontractors are responsible for complying with all contract Quality Control/Quality Assurance and Safety and Health requirements.

Table 01010-1

**1.5-Mile Removal Action—Phase 3
Station 543+50 to Station 575+33
Division of Major Work Tasks**

Work Task	Executing Party
Out-of-River Site Preparation	Excavation Subcontractor
Gravity Bypass and Sheet Pile Cell River Diversion System Installation, Operation and Maintenance	Excavation Subcontractor
Soil/Sediment Excavation	Excavation Subcontractor
Material Transport from Excavation to Stockpile Area, Stockpile Area Management, and Material Transport from Stockpile Area to On-Plant Consolidation Areas (OPCAs)	Excavation Subcontractor
Off-Site Transportation and Disposal of Excavated Materials	Transportation and Disposal Subcontractor
Water Treatment	Excavation Subcontractor
Restoration—Revegetation and Riverbed Enhancement	Excavation Subcontractor
Restoration – Plant Installation	WESTON/Planting Subcontractor
Surveying	WESTON
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 for access roads and staging areas (not shown on plans, to be determined following submittal of Excavation Subcontractor’s Excavation Plan); 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).
- b. Gravity Bypass and Sheet Pile Cell River Diversion System Installation, and/or Operation and Maintenance—The temporary dam/piping system will be operated and maintained (including removal and restoration of stop logs, monitoring of river levels, and emergency response activities related to high-flow events). This activity

- will include operation and maintenance of the removable dam, extension of the 54-inch HDPE river diversion pipes and other associated support equipment and systems for the river diversion system, installation and removal of sheet pile cells, and installation of excavation cells not consisting entirely of sheet pile (beneath the Pomeroy Avenue Bridge and near sewer crossings) (Excavation Subcontractor).
- c. Soil/Sediment Excavation (including backfill and other work items ancillary to 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/excavator 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, moving of 54-inch HDPE pipes as necessary to accomplish excavation, testing (excluding chemical analyses, which will be performed by the General Contractor) and supply of backfill, backfilling excavated areas, and placement of bank and riverbed armor and geocell systems as shown on the Drawings (Excavation Subcontractor).
 - d. Material Transport from Excavation to Stockpile Area, Stockpile Area Management, and Material Transport from Stockpile Area to 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, and transport of clean backfill from borrow locations to the river work areas for placement (Excavation Subcontractor).
 - e. Off-Site Transportation and Disposal of Excavated Materials—This activity includes off-site transportation and disposal of materials classified as non-TSCA. All required manifesting and other paperwork, coordination with disposal facilities, and coordination with the Excavation Subcontractor and the General Contractor are included in this task (Transportation and Disposal Subcontractor).
 - f. 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 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).
 - g. Restoration (Revegetation) and Riverbed Enhancement—This activity includes, but is not limited to, seeding and erosion control measures for upper bank areas as shown on the Drawings and Specifications (Excavation Subcontractor).

- h. Restoration (Plant Installation)—This activity includes, but is not limited to, providing, installing, and maintaining all containerized plants and cuttings as required (Planting Subcontractor).
- i. Surveying—This activity includes, but is not limited to, layout of excavation limits and sheet pile cells, 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).
- j. Site Monitoring—This activity includes, but is not limited to, a number of different types of monitoring activities to be conducted before, during, and following construction. Includes air monitoring; water column monitoring; vibration monitoring; settlement monitoring; water treatment system testing; all chemical testing of backfill, nonaqueous phase liquid (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 (U.S. 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 construction tasks as defined in the Drawings and Specifications (see Specification Section 01010 – SUMMARY OF WORK). All other contractors mentioned below and in the Specifications are subcontractors to the General Contractor.

Excavation Subcontractor – Contractor responsible for execution of in-river construction tasks, timber crib wall excavation and replacement, and gravel “river walk” construction as defined in the Drawings and Specifications.

Plant Installation Subcontractor – Contractor responsible for all plant installation related to the project.

Surveying Subcontractor – Contractor responsible for all construction surveys.

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 gravity bypass and sheet pile cell diversion systems, it is expected that the work area will be flooded from time to time and work will be stopped. 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 status. 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 sheet piles that require significant revisions to the sheet pile cell configuration and/or sheet pile 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 Subcontractor 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 by using existing on-site materials previously brought on-site for other phases of the project. 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/or 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 QUALITY ASSURANCE/QUALITY CONTROL PROVISIONS

The General Contractor, Excavation Subcontractor, and other subcontractors must conform to all QA/QC requirements as identified in these Specifications, including the requirements of the submittal process.

1.13 DISCREPANCIES

Discrepancies identified by the Excavation Subcontractor or other subcontractors between the Specifications, Drawings, and site conditions shall be reported to the General Contractor. Work performed by the Excavation Subcontractor or other subcontractors prior to resolution of such discrepancies by the General Contractor shall be done at the Excavation Subcontractor's or other subcontractor's risk.

1.14 SNOW REMOVAL

The Excavation Subcontractor shall be responsible for all project-related snow removal within the areas shown on the Drawings and outside of the areas shown on the Drawings,

such as access roads, staging areas, trailer areas, stockpile areas, etc. Snow shall not be plowed onto restored riverbanks, beyond silt fences, or in areas not approved by the Engineer.

1.15 "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.

1.16 WORK HOURS

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 performed 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. Quantities are based upon excavation and restoration work to be performed between Stations 543+50 and 575+33 and pipe installation to be completed between approximately Stations 544+00 and 548+00.

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 Excavation Subcontractor or the Government. Payment will be made monthly 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 for equipment and materials, temporary facilities, and the water treatment system (not shown on Drawings, detail to be provided during Excavation Plan development);

installation of 54-inch HDPE pipe (from Station 544+00 to Station 548+00) and all associated appurtenances and controls.

1.1.3 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, including monitoring of system controls (staff gauges at various locations), removal of accumulated debris, and operation of slide gate valves, etc. Removal and replacement of stop logs using previously purchased electric chain hoists is included in this item.

1.1.4 Relocation of 54-inch HDPE Pipes

- a. Unit of measure: Relocation of 54-inch HDPE Pipes will be measured as one unit for each event.
- b. Payment shall be made at the Contract fixed unit price for each complete relocation of the 54-inch HDPE pipes and shall constitute full compensation for all labor, materials, equipment, and tools required to complete all work associated with the pipe relocation, including detaching and re-attaching the pipes to the pipe anchoring system as required.

1.1.5 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 Contract lump sum for complete setup and operation of the water treatment system, including all labor, materials, equipment, and tools required to complete all work associated with successful setup and operation (meeting the specified treatment standards) of the system. Relocating the treatment system or portions of the treatment system from the Phase 1 area and/or mobilizing components of the treatment system from other locations to the Fred Garner Park area are included in this item. Demobilization of the treatment system is included in this item. Influent and effluent testing (performed by the General Contractor) is not included in this item. Prior to beginning the work, the Excavation Subcontractor shall submit a payment schedule for this item.

1.1.6 Sheet pile Containment Cells – Driving and Removing to 10-Ft Embedment

- a. Unit of measure: Payment for furnishing, installing, maintaining, and removing sheet pile containment cells, including all related excavation support system components (excluding bracing), will be measured and paid on a unit price basis, per lineal foot of sheet pile cofferdam as measured along the waterline. Sheet piles common to one or more cofferdam cells shall not be measured more than once. Typically, 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 containment cells under this item will include all work required to furnish all materials, labor, and equipment for installation, maintenance, use, reuse, and driving and removal to an embedment depth of 10 ft as required by the Specifications. No payment will be made under this item for dewatering the completed containment cells. Dewatering of the cells is paid under Item 10.

1.1.7 Sheet pile Containment Cells – Driving and Removing Below 10-Ft Embedment

- a. Unit of measure: Payment for installing and removing sheet pile containment cells, 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 cofferdam as measured along the waterline and driven below 10-ft 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 containment cells under this item will include all work required to furnish all materials, labor, and equipment for driving (and removing) sheet piles to embedment depths below 10 ft as required by the Specifications and directed by the General Contractor. No payment will be made under this item for dewatering the completed containment cells. Dewatering of the cells is paid under Item 10.

1.1.8 Installation of Excavation Cells 33 and 34

- a. Unit of measure: Payment will be made as a lump sum for the installation and removal of Excavation Cells 33 and 34 and other incidentals associated with Cells 33 and 34.
- b. Payment will be made for costs associated with installation and removal of Excavation Cells 33 and 34, located partially beneath the Pomeroy Avenue Bridge, as required by the Drawings and Specifications. Payment will be full payment for preparation of the area, including placement of jersey barriers, sheet pile, sandbags

or other approved water diversion structures, and any other incidental work associated with excavation and backfilling of Cells 33 and 34 not otherwise covered by other payment items. Dewatering and removal of contaminated soils and sediments, backfilling of the riverbed and river bank, and restoration activities shall be paid separately under other appropriate pay items.

1.1.9 Installation of Excavation Cells 37A and 38A and Cell 42A

- a. Unit of measure: Payment will be made as a lump sum for the installation and removal of Excavation Cells 37A, 38A, and 42A and other incidentals associated with Cells 37A, 38A, and 42A.
- b. Payment will be made for costs associated with installation and removal of Excavation Cells 37A, 38A, and 42A, which enclose the sanitary sewer crossings that pass beneath the Housatonic River at approximately Station 568+00 and Station 575+50, as required by the plans and Specifications. Payment will be full payment for preparation of the area, including placement of jersey barriers, sheet pile, sandbags or other approved water diversion structures, and any other incidental work associated with excavation and backfilling of Cells 37A, 38A, and 42A not otherwise covered by other payment items. Dewatering and removal of contaminated soils and sediments, backfilling of the riverbed and river bank, and restoration activities shall be paid separately under other appropriate pay items.

1.1.10 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 beyond the neatline as part of stump removal. (Penalties for excavation beyond neatline are discussed in Specification Section 02300, EARTHWORK.) Payment will be made for the volume occupied by stumps below the surrounding existing grade, 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).
- c. Measurement for 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. Payment includes segregation of materials in accordance with the requirements of Specification Section 02111, HANDLING OF EXCAVATED MATERIAL AND

BACKFILL 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); loading of materials into trucks for transport to the GE On-Plant Consolidation Areas (OPCAs) and off-site facilities; and transport from the staging area to the OPCAs. (Transport to off-site disposal facilities will be performed by other subcontractors. 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 will include installation and removal of all temporary dams at upstream and downstream ends of the work cells and all dewatering (including stormwater) required of work cells and other areas to maintain a dry excavation. Payment includes all labor, equipment, and materials required for excavation and backfill of ditches, swales, and sumps, and setup and operation of pipes, hoses, generators, and pumps etc. to provide a fully functioning dewatering system that removes water from excavations and discharges it to the water treatment system (located either within Phase 1 or at Fred Garner Park) or back to the river as appropriate. No separate payment will be made for excavations and fill materials required for installing dewatering systems.
- e. Payment will include excavation of soil, sediment, tree stumps, loose rocks and boulders, and all debris collected within the limits of excavation.
- f. The measurement for payment 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 neatline) or the volume of any material used for purposes other than as directed.

1.1.11 Geocell Installation

- a. Unit of measure: Geocell Installation will be measured to the nearest square yard parallel to the slope.
- b. Payment shall be made for all geocell slope restoration acceptably placed in areas as required on the Drawings and by the Specifications. Payment shall constitute full compensation for all labor, materials, equipment, and incidentals required to install the geocell in accordance with the Drawings and Specifications to the limits shown. Payment for the geocell restoration shall be based on the number of square yards and 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 geocell slope restoration system and any incidentals necessary to complete backfilling.

1.1.12 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 as computed by the average end area method or other suitable calculation method.
- 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 or for providing and placing fill needed for the Excavation Subcontractor dewatering system (including trenches, sumps, and other components of the system). 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 the Excavation Subcontractor and approved by the Engineer demonstrate that it has been compacted as specified. The Engineer shall complete all surveys 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. 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 Sections 02111, HANDLING OF EXCAVATED MATERIAL AND BACKFILL and Section 02300, EARTHWORK. 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.

1.1.13 Fred Garner Park Canoe Launch

- a. Unit of measure: The Fred Garner Park canoe launch to be installed at approximately Station 567+29 shall be measured and paid on a lump sum basis.
- b. Payment shall be made at the lump sum price for installation of ACB (or other approved materials) and related geotextile as part of the canoe launch 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 canoe launch in accordance with the plans and specifications. Materials required as part of the canoe launch but specified elsewhere in the bid schedule (such as 18-inch rip rap) shall be paid for separately under the appropriate bid items.

1.1.14 Riverbed Enhancement Structures (Station 547+50 to Confluence)

- a. Unit of measure: Payment will be made as a lump sum for placement and construction of riverbed enhancement structures.
- b. Payment will be made on a lump sum basis for costs associated with placement and construction of riverbed enhancement structures, including boulder clusters, wing deflectors, and rock spurs, as required by the Drawings and Specifications. Payment will be full payment for provision of materials, placement, and compaction as necessary.

1.1.15 Geotextile Fabric

- c. 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.
- d. Payment shall be made at the unit price for all geotextile fabric acceptably placed in areas as required on the Drawings 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.

1.1.16 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 Drawings 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.

1.1.17 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 at the direction of the Engineer 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.

1.1.18 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.

1.2 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. Dewatering not specifically included in the above payment items.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01080
CODES AND STANDARDS

PART 1 GENERAL

1.1 CODES, STANDARDS, AND SPECIFICATIONS

- a. Published standards, codes, or standard specifications referenced shall be the latest standard code, specification, or tentative specification of the technical society, organization, or body referred to which is in effect on the date of printing of the Drawings, unless otherwise specified. Where specific articles, sections, paragraphs, or subsections of referenced publications are not specified, the full referenced publication shall apply.

- b. Satisfactory evidence that materials and methods comply with referenced standards and codes shall be furnished when required.

1.2 ORGANIZATIONS

The following is a partial list of organizations and their abbreviations that publish codes and/or standards that may apply in the execution of the work:

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway & Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AHA	American Hardboard Association
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISE	American Iron and Steel Engineers
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AISI	American National Standards Institute
APA	American Plywood Association
AREA	American Railway Engineering Association
ARI	Air Conditioning and Refrigeration Institute
ASA	Acoustical Society of America
ASHRAE	American Society of Heating, Refrigerating and Conditioning Engineers
ASME	American Society of Mechanical Engineers

ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers' Association
AWPB	American Wood Preservers Bureau
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BIA	Brick Institute of America
BOCA	Building Officials and Code Administration International
CABO	Council of American Building Association
CBM	Certified Ballast Manufacturers
CMAA	Crane Manufacturers Association of America
CPSI	Consumer Products Safety Commission
CRSI	Concrete Reinforcing Steel Institute
DOC	United States Department of Commerce
DHUD	U.S. Dept. of Housing and Urban Development
EIA	Electronic Industries Association
EPA	US Environmental Protection Agency (USEPA)
ETL	Electrical Testing Laboratories, Inc.
FM	Factory Mutual Laboratories
FmHA	Farmers Home Administration, U.S. Dept. of Agriculture
FS	Federal Specification
GA	Gypsum Association
HPMA	Hardwood Plywood Manufacturers Association
ICC	International Code Council
IBR	Institute of Boiler and Radiator Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IMIAWC	International Masonry Industry All Weather Council
IPCEA	Insulated Power Cable Engineers Association
MBMA	Metal Building Manufacturers Association
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFOPA	National Forest Products Association
NHDOT	New Hampshire Department of Transportation
OSHA	U.S. Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	Product Standard
RCSHSB	Red Cedar Shingle and Hand Split Shave Bureau
SCS	U.S. Soil Conservation Service
SDI	Steel Door Institute
SFES	Southeastern Forest Experiment Station
SJI	Steel Joist Institute

TFS	Texas Forest Service
TPI	Truss Plate Institute Inc.
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
USD	United States Diving, Inc.
WWPA	Western Wood Products Association

1.3 STANDARD SPECIFICATIONS

- a. Construction methods and materials for applicable items of work shall be in accordance with the “Standard Specifications for Highways and Bridges” and “Construction Standards” of the Commonwealth of Massachusetts, Department of Highways for this project, unless otherwise specified.

END OF SECTION

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)
$^{\circ}\text{F}, ^{\circ}\text{C}$	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 by 11 inches so that they may be unfolded while inserted in a standard three-ring binder, with a maximum sheet size being 24 by 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 not 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 ENVIRONMENTAL AND CONDITIONS MONITORING.

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 10th 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

1. 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
2. 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 ENVIRONMENTAL AND CONDITIONS MONITORING.

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 design 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

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 ft and at obvious topographic anomalies. Stake out surveys to be conducted include limits of excavation, limits of TSCA/non-TSCA areas of excavation, property lines, limits of deeper bank excavations, and the limits of containment cells as necessary. These points are shown on the Drawings. Generate CAD-generated cross-sections every 25 ft showing the bank from limit of excavation across the riverbed to the limit of excavation on the opposite side of the river. Provide corresponding map of the work area and a table listing all points and elevations. The General Contractor shall survey the banks and riverbed, before the cell is completely dewatered to the extent practicable, 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 stake out horizontal excavation limits and identify cut depths 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 Government and General Contractor approval of the actual final cut elevations in the field, the General Contractor shall immediately stake out backfill grades to allow backfilling of approved excavated areas 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

Work Area Survey Reports – For each work area, provide 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 work area.
- 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 ft. 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 (or later version) 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 ft 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
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U.S. ARMY CORPS OF ENGINEERS TECHNICAL REPORT

WETLAND MANUAL	Corps of Engineers Wetlands Delineation Manual Technical Report Y-87-1
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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 accomplished 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 addendum in memo format to the existing Environmental Protection Plan (EPP) for the project. The plan and its addenda will include a description of how the General Contractor and his subcontractors will meet, to the extent practicable, the substantive portions of all the 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 ENVIRONMENTAL AND CONDITIONS MONITORING, the General Contractor and the Contracting Officer shall make a joint condition survey. The General Contractor shall include in the EPP 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 EPP. 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 Pomeroy Avenue, Appleton Avenue, Dwight Street, Dawes Avenue, Deming Street, High Street, Elm Street from High Street to "Harry's Supermarket" (Parcel I8-24-1), 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 its 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 BMPs 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 EPA 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 advise 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; and 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) | 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), Weston Solutions, Inc., General Electric (GE) Housatonic River Project, Pittsfield, Massachusetts, DCN: GE-022803-ABLZ, May 2003.

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 Assurance 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.

Final Field Sampling Plan (FSP) Addendum, Weston Solutions, Inc., DCN: GE-091102-ABES, September 2002, revised August 2003.

Field Sampling Plan (FSP) Addendum, Weston Solutions, Inc., DCN: GE-081203-ABSP, 12 August 2003.

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

On-Site Meteorological Program Guidance for Regulatory Modeling Applications, USEPA, June 1987, EPA-450/4-87-013.

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 environmental and conditions monitoring during the construction work being performed in Phase 3 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:

- Air Monitoring: Sampling and analysis of ambient air for PCBs and PM₁₀ (particulates 10 microns and less).
- Water Column Monitoring: Sampling and analysis of surface water upstream and downstream of the work area in the Housatonic River.
- Noise Monitoring: Monitoring the noise created by construction activities directly adjacent to work areas.
- Settlement Monitoring: Monitoring the elevations of designated points on the foundations of local buildings and structures.
- 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.
- 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.

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:

<u>SOP No.</u>	<u>Task</u>
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

Monitoring Plan Supplement; G

SD-06 Test Reports

Air Monitoring Daily Report

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

Water Column Monitoring Daily Report

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 Air Monitoring Data Deliverables

1.5.1.1 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 polychlorinated biphenyl (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 PM₁₀ 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.
- PM₁₀ Monitoring
 - Summary of PM₁₀ data for the month including daily average PM₁₀ concentrations and total hours monitored for each PM₁₀ monitoring location.

1.5.1.2 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 PM₁₀ ambient air monitoring data. The report shall contain the following information:

- Summary of the PCB and PM₁₀ sampling events for the duration of the construction work (date and time of sampling, sampling locations, number of samples collected, PCB analytical results or PM₁₀ 10-hour average readings, and meteorological data summary). In addition, the sample dates, PCB analytical results, and PM₁₀ 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 PM₁₀ ambient air monitoring including date and time of sampling, sampling locations, and results.

1.6 WATER COLUMN MONITORING

1.6.1 Water Column Monitoring Data Deliverables

1.6.1.1 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 polychlorinated biphenyl/total suspended solids (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.

1.6.1.2 Final Water Column Monitoring Report

A 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 Data Deliverables

1.7.1.1 Daily Noise Monitoring Reports

When noise monitoring data is collected, the results shall be attached to the Health and Safety section of Daily Project Report in tabular format and shall include a map showing the locations where monitoring was completed. The table shall include the average reading detected over the course of the monitoring period at each location specified.. It is not anticipated nor is it required that noise monitoring be completed each work day, therefore, Daily Noise Monitoring Reports shall be included only with the Daily Reports when monitoring is actually completed.

1.7.1.2 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 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.

1.8.2 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 be 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 ft 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, these 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 Data Deliverables

1.9.1.1 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.

1.9.1.2 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 Initial Conditions Survey Deliverables

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 frame showing the contract title and number, and the name and address of the structure or location 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).
- An audio and video recording record of exterior of the structure and surrounding grounds, outbuildings, pools, and fences shown from the established reference point.
- Unless access to the interior of the structure cannot be obtained, 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 provide two 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 of the project monitoring data as described in the previous 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 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 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 m³/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 PM₁₀ Monitoring

A MIE data RAM Model PDR-1200 real time PM₁₀ monitor shall be used to monitor and record particulate concentrations with a mean diameter of 10 microns or less (PM₁₀). These instruments are not designated as USEPA reference methods for the collection and determination of PM₁₀ as specified under 40 CFR, Part 50, Appendix J. These instruments provide approximate measurement of the sum of particulates and aerosol PM₁₀ 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. If a property owner does not wish to have a DMP installed using the bolt and anchor, a less intrusive method that is acceptable shall be used such as marking or notching the structure.

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. A digital camera shall be used to produce digital photographs of site and structural features.

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 hazardous, toxic or radiological waste (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 to evaluate corrective actions to address exceedances of applicable ambient air standards.

3.1.1 Perimeter Air Contaminant of Concern

PCBs and PM₁₀.

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 µg/m³
- b. Time: 24 hours

Action Level (Time-Weighted Average)

- a. Concentration: 0.1 µg/m³
- b. Time: 24 hours

3.1.2.2 PM₁₀

Notification Level (Time-Weighted Average, 80% of 24-hour National Ambient Air Quality Standard [NAAQS] for PM₁₀)

- a. Concentration: 120 µg/m³
- b. Time: 10 hours

Action Level (Time-Weighted Average, 24-hour NAAQS for PM₁₀)

- a. Concentration: 150 µg/m³
- b. Time: 10 hours

These levels are more conservative than the NAAQS for PM₁₀, 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 off-site; 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 PM₁₀ 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. PM₁₀ 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 m³/min.

Average Sample Volume: 370 m³

3.1.5.2 PM₁₀

A MIE data RAM Model PDR-1200 real time PM₁₀ monitor shall be used to monitor and record particulate concentrations with a mean diameter of 10 microns or less (PM₁₀). These instruments are not designated as USEPA reference methods for the collection and

determination of PM₁₀ as specified under 40CFR, Part 50, Appendix J. These instruments provide approximate measurement of the sum of particulates and aerosols PM₁₀ 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 PM₁₀ 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 sections of this specification.

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 or Holmes Road) \geq Upstream (Lyman Street)+ 5 $\mu\text{g/L}$

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

3.2.3 Sampling/Monitoring Locations and Frequencies

A total of three 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.
- Downstream Location (located at least 200 feet downstream of the active work area) – Daily turbidity; twice monthly PCB and TSS sampling plus water temperature and stage height measurement.

Once construction activities reach to within 200 ft of the current downstream sampling location (located approximately 600 feet downstream of the Pomeroy Avenue Bridge), the downstream monitoring location shall be relocated to the Holmes Road Bridge or other appropriate downstream location. However, once the downstream monitoring location is moved, any action level exceedances will need to be evaluated on a case-by-case basis taking into consideration potential negative impacts to monitoring associated with the confluence of the West Branch of the Housatonic River.

In addition, monitoring shall be performed at the Newell Street, Lyman Street, and the downstream monitoring stations for PCBs and TSS during approximately three specific events. For example, monitoring will be performed during the following: a high flow event, excavation of NAPL-impacted sediments, and installation or removal of sheet pile, 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 SOP SW-6 of the Addendum to the Final FSP dated August 2003 (DCN: GE-081203-ABSP), revised August 2003. 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 downstream monitoring locations and converted to elevations during the beginning and end of each sampling event. 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 locations. A rating curve has not been developed for the Holmes Road Bridge, therefore, once the water column monitoring location is relocated downstream, stage measurements shall continue to be collected at the Pomeroy Avenue location to approximate the flow contributed by the East Branch at the confluence 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 SOP SW-6 of the Addendum to the Final FSP dated August 2003 (DCN: GE-081203-ABSP), revised August 2003. 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 SOP SW-6 of the FSP.

Sample processing will follow the procedures outlined in SOP SW-6 of the FSP. Any deviations from the procedures outlined in the FSP shall be noted in 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 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-average (dBA) over the course of a workday and during non-work hours. Instantaneous noise levels will also be monitored. Noise readings will be obtained at lease/easement boundaries adjacent to work areas, including staging areas, as necessary.

3.3.1 Action Levels

Readings indicating exceedances of the 65-dBA will be reported immediately to the Government, 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 24 hours/day to include all work periods such as nighttime pumping activities 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 and shall meet the 65 dBA action level during non-working hours.

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 structures depicted on the attached maps, Figure 01410-1 and Figure 01410-2.

Each permanent structure, including houses and garages, on the properties depicted on the attached figures shall be monitored for settlement. Non-permanent structures like sheds shall not be monitored for settlement.

3.4.2 Scheduling

Two elevation surveys shall be performed to identify settlement in the structures depicted on the attached maps. 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 depicted on the attached maps 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-ft accuracy and the elevations shall be within 0.01-ft accuracy.

3.5 VIBRATION MONITORING

3.5.1 Structures to be Monitored

The structures depicted on the attached maps, Figure 01410-1 and Figure 01410-2 shall be monitored for vibration.

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 ft of the structures shown.

3.5.3 Security and Coordination with Property Owners

Based on proximity to the work, and an evaluation by the Project Engineer, monitoring devices shall be placed on each of the structures at appropriate times and shall be secured from theft and protected from the weather. The location of the monitoring devices 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.
- 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 structures and areas depicted on the attached maps, Figure 01410-1 and Figure 01410-2 shall be monitored for conditions.

The east and west banks of the Housatonic River from Dawes Avenue to the Confluence with the west branch of the Housatonic river.

The staging area to be located at Fred Garner Park or other areas.

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.

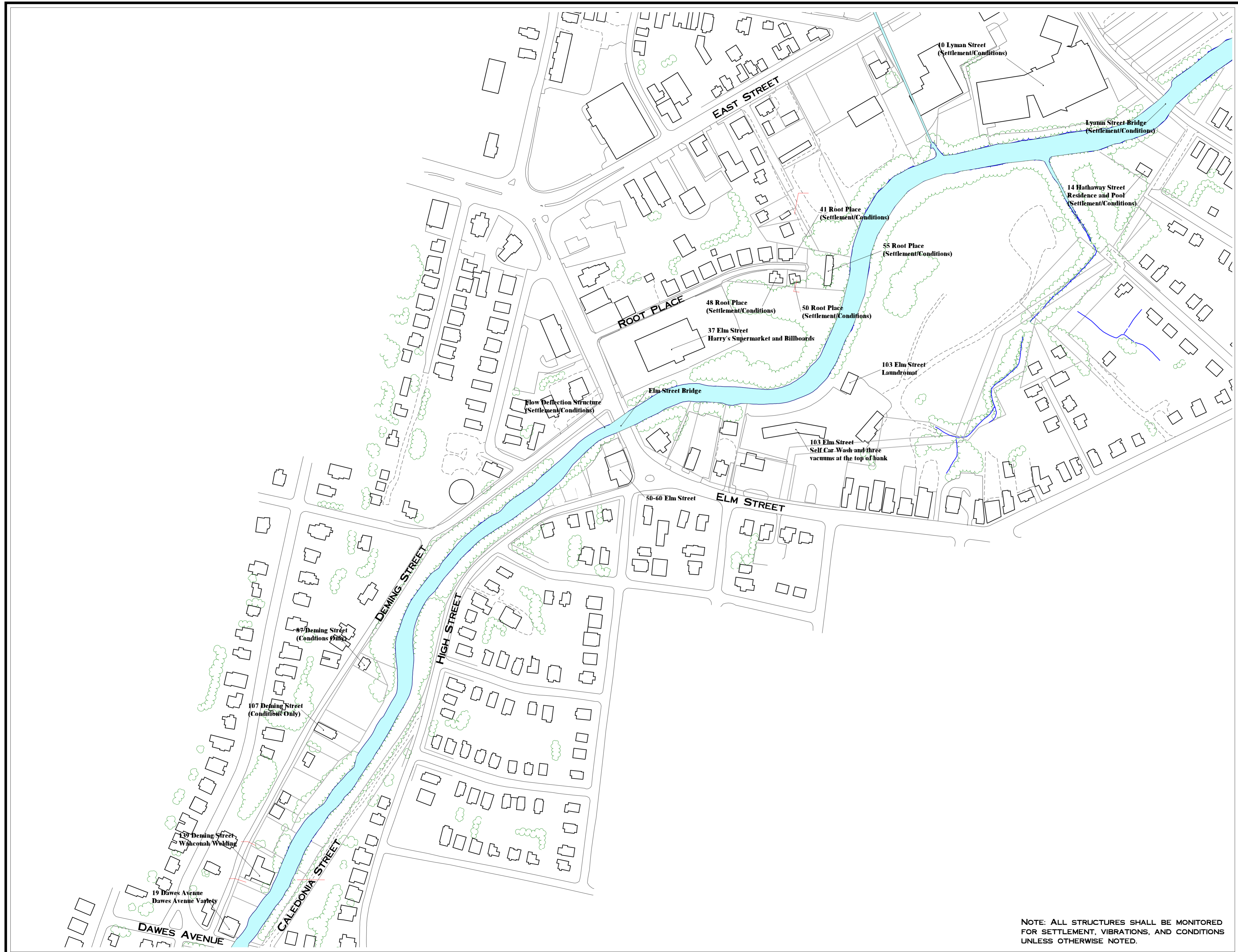
3.6.3 Methods

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) or equivalent and the extent of the survey, but generally all structures within 100 ft of the work area shall be completely surveyed as herein defined. Note that additional structures may be monitored for conditions as construction activities progress and circumstances are encountered warranting such action.

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's 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.

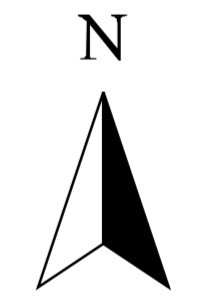
END OF SECTION



LEGEND:

-  ROADS
-  HYDROLOGY

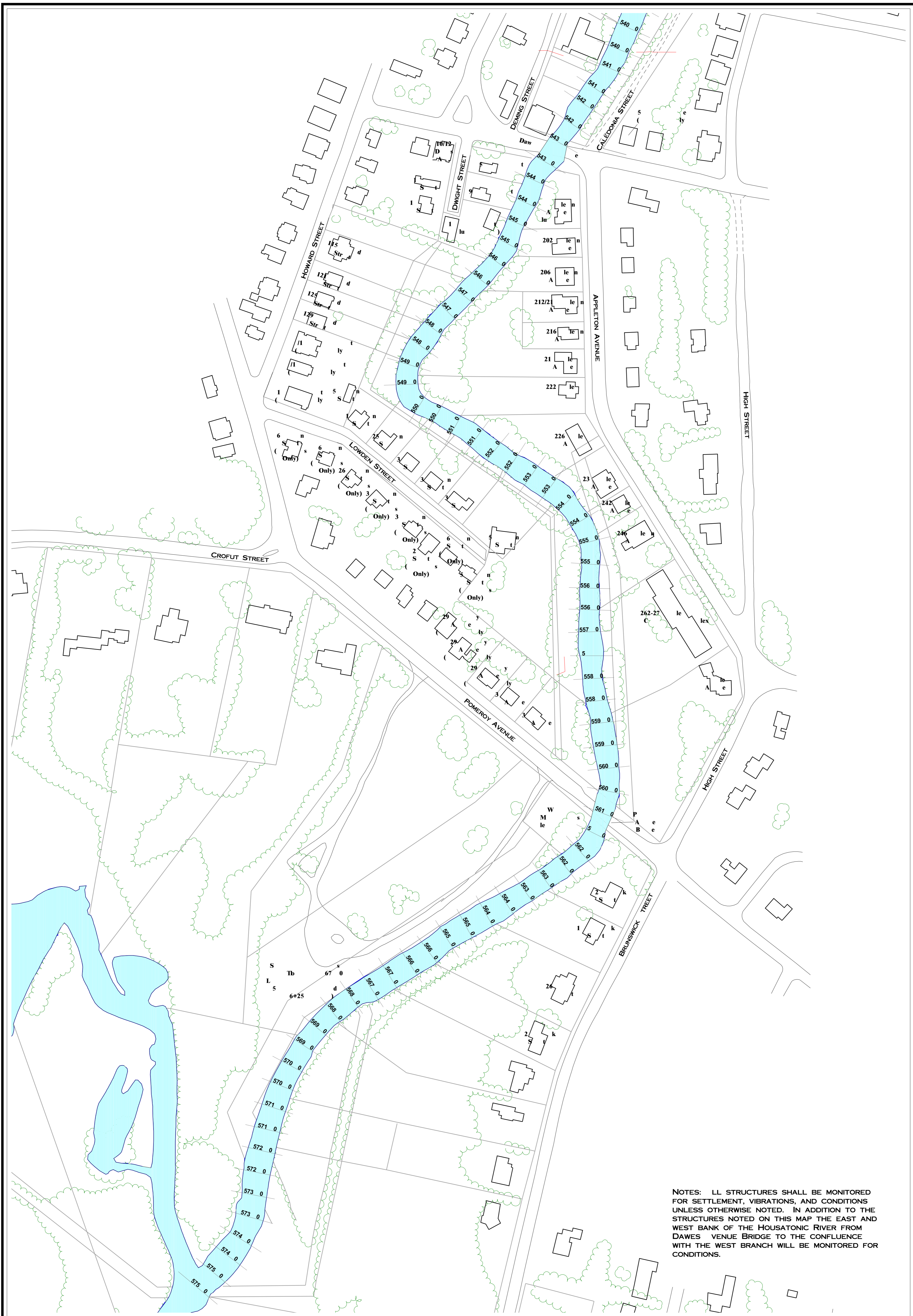
**DRAFT CONFIDENTIAL
FOIA EXEMPT**



**HOUSATONIC RIVER PROJECT
PITTSFIELD, MASSACHUSETTS**




**FIGURE 01410-1
Phase 3 Structures
Settlement/Vibrations/Conditions Monitoring**

NOTE: ALL STRUCTURES SHALL BE MONITORED FOR SETTLEMENT, VIBRATIONS, AND CONDITIONS UNLESS OTHERWISE NOTED.



NOTES: LL STRUCTURES SHALL BE MONITORED FOR SETTLEMENT, VIBRATIONS, AND CONDITIONS UNLESS OTHERWISE NOTED. IN ADDITION TO THE STRUCTURES NOTED ON THIS MAP THE EAST AND WEST BANK OF THE HOUSATONIC RIVER FROM DAWES VENUE BRIDGE TO THE CONFLUENCE WITH THE WEST BRANCH WILL BE MONITORED FOR CONDITIONS.

LEGEND

-  ROADS
-  HYDROLOGY
-  STATION



**HOUSATONIC RIVER PROJECT
PITTSFIELD, MASSACHUSETTS**

**FIGURE -
Phase Structures
Settlement/Vibrations/Conditions Monitoring**

DRAFT CONFIDENTIAL FOIA EXEMPT

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

The General Contractor shall submit a supplement to the CQC Plan as an addendum in memo format to address relevant changes and additions for Phase 3.

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 are 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 when work is in progress, 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 third 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 third 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 its 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 Hazardous, Toxic, Radiological Waste (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 task order (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, and 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. 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 U.S. Army 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 and/or 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 and/or 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 its 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. The site plan shall be submitted as a part of the Excavation Plan, which is required elsewhere in these Specifications.

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 areas designated by the Contracting Officer. 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, 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 its determined needs during construction activities.

1.5.2 Storage Area

The General Contractor 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 OPCAs 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 as well as 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, placement, and in situ physical testing of backfill material will be performed by the Excavation Subcontractor. Chemical testing of backfill materials will be performed by the General Contractor.

Currently, the contaminated materials staging area is located on GE property. This area may require relocation to the Fred Garner Park area. Furnish all labor, material, tools, and equipment to construct or accomplish the following:

1. Operation and maintenance of the contaminated materials staging area located on GE property and/or the Fred Garner Park property owned by the City of Pittsfield for the purposes of dewatering and characterizing contaminated materials prior to disposal at the OPCAs and at off-site disposal facilities. This also includes handling of debris in accordance with this Specification. If needed, additional contaminated material staging areas will be designated by the General Contractor.
2. Operate and maintain truck wash pads to be located near the active excavation to eliminate the deposition of construction-related materials from the trucks onto roadways while en route to the contaminated materials staging areas. Operate and maintain decontamination wash pads at the contaminated materials staging area(s) 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(s) 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 or move within the riverbed from contaminated areas to backfilled areas 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 and those to be constructed in Phase 3 along private property (properties adjacent to the 1.5 Mile Reach) are considered to be "on-site" for purposes of this evaluation. Manifesting may be required for vehicles transporting contaminated material on public roads. Manifesting will be required for vehicles transporting contaminated materials on public roads unless EPA has determined the public roads in question are "on site", as defined by CERCLA. This determination has been made in three memoranda dated November 27, 2002 (GE-Pittsfield/Housatonic River Site: 1.5 Mile Reach/On-Site Permit Requirements), December 4, 2003 (GE-Pittsfield/Housatonic River Site: 1.5 Mile Reach/On-Site Permit Requirements for Phase 2 Work from Elm Street to Dawes Avenue), and October 21, 2004 (GE-Pittsfield/Housatonic River Site: 1.5 Mile Reach/On-Site Permit Requirements for Phase 3A Work from Dawes Avenue South 400 Feet). These approved routes include perpendicular crossings and segments of travel along Dwight Street, Dawes Avenue, Deming Street, Caledonia Street, High Street, Elm Street, Newell Street, Lyman Street, East Street, Tyler Street and New York Avenue. EPA will make subsequent determinations for additional public roads for the remainder of Phase 3.

1.3 DESCRIPTION OF WORK

The work conducted by the General Contractor shall consist of chemical sampling and analysis 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 be required for off-site disposal purposes. Off-site disposal shall be coordinated by the General Contractor.

Work conducted by the Excavation Subcontractor shall consist of decontaminating trucks; temporarily storing contaminated materials; providing testing (geotechnical only, see also Specification Section 02300 EXCAVATION); delivering, storing, and placing of backfill; hauling contaminated materials from the active excavation; hauling contaminated materials to the GE OPCAs for final disposal; and loading of trucks for off-site 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 that isolates contaminated materials within an exclusion zone while the material is being gravity dewatered, characterized, and/or accumulated for disposal at the OPCAs or an off-site disposal facility.

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. Characterization sampling of excavated materials to be conducted by the General Contractor will be required for materials sent for off-site disposal. Materials sent to the GE OPCAs shall not require characterization sampling.

1.5 BACKFILL MATERIALS TESTING

Backfill materials shall be tested for geotechnical and chemical parameters and fully approved by the General Contractor and the Government 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

Pavement or polyethylene liners shall be used to line the areas for stockpiling contaminated materials. HDPE liner material shall be a minimum of 40-mil thick. 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 at Fred Garner Park and GE property if necessary) 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 that 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 or to off-site disposal facilities. 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. 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 as 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.

Materials shall not be hauled to the OPCA or off-site facilities until they have been determined to be devoid of free liquids. The time required to dewater materials to an acceptable moisture content shall also be considered when sizing the staging areas.

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. When the OPCA is opened solely for EPA work, the Excavation Subcontractor shall ensure the delivery of 30 truckloads of material to the OPCA each day the OPCA is open (excluding the final day of hauling). If the OPCA is open for work other than EPA work, then no minimum number of loads is required.

Similarly, loading (by Excavation Subcontractor) and hauling (by off-site Transportation and Disposal Subcontractor) of materials from the contaminated materials stockpile to off-site disposal facilities will be limited to certain days and shall be performed as batch operations. The Excavation Subcontractor shall coordinate with the General Contractor and the off-site disposal subcontractor to schedule the days on which off-site transportation and disposal will occur. The Excavation Subcontractor shall appropriately schedule its work activities so that labor and equipment are made available to load off-site hauling trucks when they arrive on site, minimizing any down time.

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, and stockpiled

to the appropriate staging area. However, for saturated soils and sediments, an interim dewatering measure shall be implemented to allow for transport to the contaminated materials stockpile areas described in Subsection 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 in general 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 (including those materials that are classified as coarser grained) shall ultimately be consolidated in the Building 71 Cell GE OPCA, and all non-TSCA soils and sediments shall be disposed of at an appropriate off-site facility or consolidated on-site in the Hill 78 GE OPCA. Materials excavated from previously uncharacterized depths or areas shall be segregated as material to be sampled and characterized. Based on the results of the sampling, the uncharacterized materials will be classified as TSCA- or non-TSCA-regulated.
- b. NAPL—NAPL-impacted soil and sediment will be stockpiled separately, pending characterization and off-site disposal. NAPL-impacted soil will be segregated as either TSCA-regulated or non-TSCA-regulated depending on the classification of the area from which it was generated.

3.4 SAMPLING

In situ confirmation sampling and sampling from stockpiles is not required for excavated materials to be disposed of at the GE OPCA. Sampling of stockpiles will be performed for materials to be transported for off-site disposal. This sampling will supplement existing in-place chemical data and will be implemented to meet the specific requirements of the off-site disposal facility to receive the material.

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 2,000 cy of material

VOCs, SVOCs, Metals: 1 sample per 2,000 cy of material

TPH: 1 sample per 2,000 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, VOCs, SVOCs, and metals, 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. In general, MCP S-1 Standards will be used for non-PCB compounds. Chemical testing shall be performed on suitable materials with an anticipated quantity of 200 cy or greater.

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

The Excavation Subcontractor shall handle separately various types of waste (TSCA materials, non-TSCA materials, non-TSCA cobbles and boulders, NAPL-containing materials, and oversize 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 and off-site disposal facilities in accordance with the Consent Decree. All material excavated shall be characterized by the area from which it was excavated. Therefore, stumps, concrete, metal, 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. Debris scheduled for on-site disposal at the OPCAs that is larger than 4 feet in any dimension, including stumps, metal, concrete, etc., shall be segregated by the Excavation Subcontractor for purposes of size reduction before transport to the OPCAs. Similarly, debris scheduled for off-site disposal shall be segregated for purposes of size reduction. The selected off-site disposal facility has a maximum particle size requirement of 3 ft and does not accept any metallic debris. In addition, materials shall be sized appropriately so as not to damage trucks used for off-site disposal.

3.6 DECONTAMINATION AND TRUCK WASH PADS

Decontamination pads shall be constructed at each contaminated materials staging area when in use by the Excavation Subcontractor. 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 shall be constructed to allow sufficient room for truck decontamination as described in this subsection. The pad shall be 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 $\mu\text{g}/100 \text{ cm}^2$, 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

Areas potentially available for staging of soil and sediment include GE property, Fred Garner Park, or other areas to be determined by the Engineer. The area(s) to be used 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 that 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. The Excavation Subcontractor shall store separately materials (not including debris that must be stored separately) classified as TSCA, non-TSCA, non TSCA cobbles/boulders, and NAPL-impacted. In general, and if practicable, water-releasing materials shall be kept inside buildings and non-water releasing materials shall be stored at designated outside stockpiling areas. Additionally, materials excavated from areas beyond the limits of remediation shall be stockpiled separately for characterization if required by the Engineer.
- 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, and other material larger than 4 ft in size for OPCA disposal or 3 ft in size for off-site disposal) removed from the excavation area. Metallic debris is not permitted at the off-site disposal facility and shall be consolidated in the OPCA. 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. All debris shall be reduced in size to a maximum size of 4 ft in any dimension before transport to the OPCA or to a maximum size of 3 ft before off-site disposal.

3.10 BACKFILL MATERIAL STORAGE

Backfill materials shall be stored on-site in Government-approved areas. The areas designated 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. Currently the areas designated for backfill storage are the Lyman Street Parking Lot on GE property and potentially Fred Garner Park, if there is sufficient room.

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 areas and the decontamination and truck wash pads. Activities or events that will generate contaminated wastewater include steam/high pressure washing at the decontamination

and truck wash pads, 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

Table 02111-1

Backfill Testing Frequencies and Methods

EARTHEN MATERIALS	TEST METHODS WITH TEST FREQUENCY REQUIREMENTS BASED ON CUBIC YARDS										
	C136	D75	D421/422	D1557	D2216	D2974	D4318	D4253	D4254	D5519	EM-1110-2-2302
Common Fill			500	1000	500	500	500				
Structural Fill			500	1000	1000	1000	1000				
Filter Material	500			1000	500	500	500				
Bank Run Gravel			500	1000	500	500	500				
Select Gravel	500			1000	1000	1000	1000				
Sand	500	1000									
Processed Gravel		1000	500	1000	1000	1000	1000	see note 4			
Screened or Crushed Stone		1000	500	1000	1000	1000	1000	see note 4			
Topsoil (See note 6)			500		500	500	500				
9-inch Riprap										2000	500
12-inch Riprap										2000	500
18-inch Riprap										2000	500

Notes:

- 1) Two pre-construction samples of each material from each borrow source shall be tested prior to the use of that material.
- 2) If the pre-construction test results satisfy the specification requirements, the pre-construction test results may be counted as part of the frequency testing requirements.
- 3) If a material is obtained supplied as generated from a quarrying operation, i.e., the material is crushed and screened to achieve a specified gradation, the testing frequency may, at the discretion of the Engineer, be reduced to 1 test per 1,000 cubic yards of material.
- 4) ASTM D4253/4254 shall be performed on materials that are too granular to be compacted using ASTM D1557.
- 5) ASTM D4318 is not required for materials that are predominantly granular in composition based on visual inspection.
- 6) Topsoil testing shall also include pH at the same frequency.

ASTM Test Methods and Descriptions

- C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- D75 Standard Practice for Sampling Aggregates, ASTM C136-01 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- D422 Standard Test Method for Particle Size Analysis of Soils
- D1557 Moisture-Density Relationship by Modified Proctor Compaction
- D2216 Laboratory Determination of Water (Moisture) Content
- D2974 Organic Content
- D4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- D4253 Maximum Index Density and Unit Weight of Soil Using a Vibratory Table
- D4254 Minimum Index Density and Unit Weight of Soil and Calculation of Relative Density
- D5519 Standard Test Method for Particle Size Analysis of Natural and Man-Made Riprap Materials, Method A

USACE Test Methods and Descriptions

- EM-1110-2-2302 Field Visual and Index Testing

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 segments 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, personnel, and material, to meet the following requirements and shall be staged in a manner that minimizes contact with the river or ground surfaces. Gross deposits of soil shall be removed from all cut materials prior to transporting the material to the appropriate staging area to be 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 as ground cover at the GE OPCAs or another approved 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 does 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 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

Clearing activities shall be sequenced concurrent with excavation activities. Mass clearing of the site is not permitted. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off to the following heights: 6 inches or less above the original ground

surface if located within the limits of excavation, and as close to the original ground surface as possible without causing contamination of cut wood or equipment if located outside of the limits of excavation. Clearing outside the limits of excavation shall be limited to a distance of 2 ft beyond the limit of excavation except that dead vegetation, overhanging limbs, or trees that are deemed to be leaning excessively toward the work area shall be cleared. Clearing shall be minimized to areas necessary for the progression of construction activities. The Excavation Subcontractor shall use appropriate measures to eliminate the possibility of cut trees and branches from coming into contact with contaminated soils and sediments. Cleared material that comes into contact with contaminated soils and sediments and which have visible evidence of this contamination shall be decontaminated or disposed of as contaminated waste.

The General Contractor shall clearly flag or mark trees to be left standing and trees and limbs outside the limit of excavation that are to be removed for approval by the Government. The Excavation Subcontractor shall clear only those trees identified 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

Grubbing activities shall be sequenced concurrent with excavation activities. Mass grubbing of areas intended for excavation is not permitted. 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. 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 reduced in size to a maximum 4-ft size and subsequently transported to an OPCA specified by GE for disposal. Alternatively, this material could be sent off-site for disposal. Material sent for off-site disposal would meet the specific size requirements and other restrictions of the selected off-site disposal facility (currently debris larger than 3 ft in any dimension and metallic debris is not allowed). Concrete debris generated during site preparation and excavation activities shall be stockpiled for later size reduction (4-ft maximum size for disposal at OPCAs).

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 Site Preparation Plan shall be submitted as a part of the Excavation Plan (identified in other sections of these specifications), which shall be submitted prior to the start of work with sufficient review time included for the General Contractor and the Government. 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 Phase 3 Reach and restoration construction along the riverbed and riverbank (see Section 02930 BANK REVEGETATION PHASE 3) 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 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	Concrete Aggregates
ASTM C 97	Absorption and Bulk Specific Gravity of Natural Building Stone
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM D 422	Particle-Size Analysis of Soils
ASTM D 1140	Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2167	Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	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 Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- ASTM D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D 5519 Particle Size Analysis of Natural and Man-Made Soils

COMMONWEALTH OF MASSACHUSETTS, DEPARTMENT OF HIGHWAYS

State Specifications (1995) 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 Laboratory Soils Testing

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1926 Subpart P Excavations

1.2 SUBMITTALS

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

SD-01 Preconstruction Submittals (note that all plans can be combined into one submittal by the Excavation Subcontractor): G

Excavation Plan

- a. Proposed construction sequence shall address the following: Protection of utilities and structures, excavation of channel sediment and bank soil, and method to minimize conveyance of contaminated material over remediated areas. Means, methods, and sequence for backfill placement and equipment type 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.
- b. The method for coordinating survey control (real-time) with the General Contractor during construction, and minimizing excavation volumes while ensuring that the work conforms to excavation grades shown on the Drawings in accord with the tolerances listed in this Specification, shall be described.

- c. Method to prevent cross-contamination from one-half of the river to other half in the Phase 3A where gravity diversion piping will be used rather than sheetpile cells.
- d. 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 and leakage through the sheet pile walls. 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.
- e. 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.
- f. 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/Design Analysis for Phase 3 of the 1.5-Mile Reach Removal Action. These data represent the subsurface information available; however, variations may exist in the subsurface between boring locations.

1.4 SOIL AND SEDIMENT EXCAVATION

Soil and sediment excavation shall include the satisfactory removal of all materials, including materials classified as boulders, concrete, and debris. Soil and sediment excavation shall include earthen and fill material located within the Limit of Remediation shown on the Drawings, except those specified below. As indicated on the subsurface investigation logs available in the Pre-Design/Design Analysis for Phase 3 of the 1.5-Mile Reach Removal Action, soil and sediment includes boulders and debris less than 5 ft in nominal diameter,

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 and other debris are considered incidental to soil and sediment excavation.

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 do 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. Unless otherwise approved by the Engineer, 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

Note: 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 tested, 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 SC, SM, SW, SP-SM, 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.

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

Maximum clod size shall not exceed 4 inches.

Material shall have an organic content less than 6% as measured by ASTM D 2974.

Material shall have a maximum dry density not less than 110 pounds per cubic foot (pcf) as determined by American Society for Testing and Materials (ASTM) D 1557, 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 Subsection 3.6 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.

2.2 STRUCTURAL FILL

Structural fill shall meet the quality, durability, and composition requirements for State Specification M2.01.7 Dense Graded Crushed Stone and shall meet 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 C 33 and the gradational requirements specified in the following tables.

2.3.1 Filter Materials

Filter materials shall conform to the following gradational requirements and shall satisfy the State Specification for quality, durability, etc. as specified in Section M2 of the State Specifications:

Filter Materials

Sieve Size	Percent Finer by Weight		
	Filter I	Filter II	Filter III
7-inch	100		
6-inch		100	
4-inch	80-100	70-100	
2½-inch	65-88	45-90	
1½-inch		25-70	
1-inch	30-70	5-55	
½-inch	20-60	0-35	
¼-inch		0-25	
No. 4	5-40		100
No. 10			70-95
No.20		0-10	35-75
No. 40	0-15		10-60
No.100			0-40
No. 200			0-15

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%, 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 preceding 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 following tables 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 on the Drawings will be derived from approved off-site sources. Topsoil sources shall include, but not be limited to, those created by natural geological processes or those manufactured by the addition of compost to a base soil. 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 be tested according to the listed ASTM standard and meet the following requirements:

- The fraction passing the No. 10 sieve shall contain between 10 and 25% clay, 25 to 55% silt, and 20 to 55% sand, by mass (ASTM D 422).
- Total organic matter between 4 and 12% by mass (ASTM D 2974).
- pH between 6 and 7.5 (ASTM D 4972).

The total organic matter content can be amended with compost from approved sources. If topsoil is to be amended with compost, the compost shall be free of weed seeds and comply with EPA Chapter 40 CFR Part 503 (e.g., pathogens, metals). Compost shall be an organic substance produced by the biological and biochemical decomposition of source-separated compostable materials that may include, but are not limited to, leaves and yard trimmings, food scraps, food processing residues, manure and/or other agricultural residuals, and/or

wood chips. 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.
- Conductivity of less than 5 mmhos/cm.
- Human inerts are less than 1.0% (by dry weight).

Samples of the compost must be tested and approved for use by the Engineer prior to blending with soil. After blending is complete, the product shall be tested to ensure it meets the physical and chemical requirements stated herein.

2.8 GEOTEXTILE

Geotextile to be used in conjunction with general site construction (e.g., temporary applications, drainage swales, etc.) shall conform to the following mechanical and hydraulic properties. The geotextile manufacturer 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	D 4833	oz/sy	8
Puncture Strength	D 4751	lbs	100
Apparent Opening Size	D 4632	min.	≤ No.80 sieve
Grab Strength (MD)	D 4632	lbs	200
Grab Elongation	D 4632	%	> 50
Trapezoidal Tear Strength	D 4533	lbs	80
Mullen Burst Strength	D 3786	psi	325
Permittivity	D 4491	sec ⁻¹	≥ 0.8
UV Resistance ³ (@500 hours)	D 4355	% strength retained	> 70

NOTES:

¹Minimum average roll value (MARV).

²For information only, not a required property.

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

2.9 DEWATERING SYSTEM

The dewatering system shall consist of pumps, sumps, pipelines, sediment filters, sedimentation basins, and other equipment necessary for the collection, removal, and disposal of surface water and groundwater within each containment cell. Dewatering shall be accomplished with sumps and pumps, and/or such other means selected and designed by the Excavation Subcontractor and acceptable to the Engineer.

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, i.e., soft, unstable, and yielding 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.

Excavation along the riverbank toe and within the riverbed shall proceed in a manner such that any area that has been excavated can be protected and/or stabilized in advance of an anticipated storm event during which the dam may be overtopped or containment cells flooded. The Excavation Subcontractor shall have materials, equipment, and personnel on-hand to implement protection and/or stabilization measures if and when directed by the Engineer. Protection and/or stabilization may be in the form of final restoration or in the use of temporary materials such as sacrificial riprap, articulating concrete block, plastic sheeting, etc.

During and following completion of excavation along and in close proximity to the riverbank toe and before final restoration, the Excavation Subcontractor shall implement a riverbank inspection program, which shall consist of visual inspections of the riverbank, roadways, utilities, and structures immediately adjacent to the excavated area at least twice daily, and more frequently if warranted by conditions and as directed by the Engineer.

Due to the potential for snow to accumulate on the riverbanks, both from natural deposition and snow plowing operations on adjacent streets and properties, the Excavation Subcontractor must be particularly vigilant of potential slope instabilities at this time. The snow, acting as a surcharge load, could cause slope instabilities and because the ground will not be visible, it will not be possible to observe the formation or development of tension

cracks on the ground surface. The Excavation Subcontractor should also be aware of the potential for snow to slide into the work area from the riverbanks. Based on these conditions and the above-mentioned site inspections, the Engineer may implement additional conditions monitoring activities such as vibration and settling monitoring at specific locations to support slope stabilization implementation decision-making.

If areas of potential instability are observed, the Excavation Subcontractor shall immediately notify the Engineer. It is anticipated that, at a minimum, immediate placement and compaction of structural fill at the toe of the riverbank will be required to stabilize the riverbank. However, required actions will be directed by the Engineer on a case-by-case basis. Temporary closure of roadways, driveways, and parking lots may also be required.

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. Excavation shall be initiated at the top of bank and shall proceed down slope unless otherwise approved by the Engineer. 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. 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.

3.1.3 Excavation to Bedrock

Excavations shall be made to the lines, grades, and elevations shown. If bedrock is encountered, the Excavation Subcontractor shall terminate excavation work and notify the Engineer.

3.1.4 Excavation Adjacent to Existing Structures

Excavations adjacent to and in close proximity to existing structures (e.g., residential structures, bridge abutments, sewer lines and vaults, utility poles, etc.) shall be completed in a manner that will not damage the structure or create a safety hazard. When excavating adjacent to a bridge abutment or sewer vault, the bottom of the excavation shall not be

extended below the bottom of the footing/foundation. When excavating in close proximity to buried lines, the alignment of the sewer line shall first be exposed by carefully excavating around the line using equipment or by hand. The exact location, horizontal and vertical, of the line shall be recorded. The Excavation Subcontractor shall stop work and notify the General Contractor immediately if the location of an existing structure will interfere with the completion of the Work.

The Excavation Subcontractor shall exercise extreme care when working adjacent to existing structures and utilities.

Structures of particular note that are either close to or within the limits of remediation include: garages located on the east and west banks just downstream of the Dawes Avenue Bridge, the bridge abutments at Pomeroy Avenue, the electrical substation located immediately downstream of Pomeroy Avenue, two sewer siphons that cross beneath the river near Fred Garner Park and the Confluence with the west branch, and an overhead power line crossing near Fred Garner Park. No buildings are planned for demolition.

3.1.5 Bank Excavations Greater than 4 feet

Based on previous site experience, temporary near-vertical cuts of up to about 8 ft in height have been achieved on the banks. However, due to the variability of soil type and density, moisture conditions, excavation methodology, bank slopes, etc., a cut depth of 8 ft on the banks cannot be assumed to be achievable or safe. Methods and procedures to stabilize areas where excavation depths will exceed four feet as measured vertically have not been developed by the Engineer due to the variability of the geologic conditions that could be encountered in all areas of the site (e.g., loose fill, dense till, bedrock),

The Excavation Subcontractor shall be responsible for the stability of all areas that are to be excavated. The Excavation Subcontractor shall implement measures appropriate for the conditions encountered to ensure public and worker safety as well as the safety of structures in close proximity to the excavation. All work shall be completed remotely and under the direction of a competent person as defined by OSHA. **No worker** shall enter the potential collapse zone without the use of appropriate shielding, slope stabilization, or other suitable temporary excavation support methods subject to the approval of the Engineer. The Excavation Subcontractor shall ensure that appropriate barricades are erected around the perimeter of the potential collapse zone to prevent unauthorized access, especially during non-working hours. Because vegetation and/or snow may obscure the ground surface upslope of the over-excavated area, the Excavation Subcontractor shall assume that the area is in imminent danger of collapse at all times when shoring is not in place and shall approach the work area accordingly. In accordance with OSHA, the Excavation Subcontractor shall inspect excavated areas daily and as required by the Engineer. All inspections shall be documented and photographed. Requirements of 29 CFR 1926 Subpart P shall be implemented.

3.1.6 Excavations Within Sheetpile Cells

The design of the sheetpile cells is based on a 3-foot excavation from existing grade with a water level at the maximum permitted elevation as shown on Drawing 1021 (see Sheet Pile Installation Schedule). In general, when excavation cuts exceed 3 feet (e.g., at aggrading bar locations), excavation shall proceed at the direction of the Engineer. Note that excavation activities must be performed in accordance with this specification as well as Specification Section 02464 – SHEETPILE CONTAINMENT CELL CONSTRUCTION AND DEWATERING and Drawing No. 1021 – SHEETPILE INSTALLATION DETAILS.

Similarly, in the event that excavation depths exceed those established in the design drawings, requirements established on Drawing 1021 (see Sheet Pile Installation Schedule) shall be met; including that excavation shall proceed at the direction of the Engineer. Limitations for excavation at depths greater than those specified on Drawing 1021 will depend on site-specific conditions at the time of the planned excavation that must be evaluated by the Engineer.

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 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 compliance with the requirements of these Specifications. 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 Drawings.

3.4 DEWATERING AND CONVEYING

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

The initial dewatering sequence when using sheet pile containment cells shall include the following tasks:

- a. Pump the water from within the work area using a pump intake and flow rate to minimize suspending and entraining solids.
- b. Water pumped from within the work area shall be discharged to the river until 6 inches of water remains in the work area near the pump intake.
- c. Water pumped from the work area shall be routed to the treatment system when the water depth in the containment cell is decreased to 6 inches, or if the Engineer determines that excess turbidity or sheens are visible in the water discharged from the containment cell.
- d. The Excavation Subcontractor shall isolate the terminus of outfalls from the work area using sheet pile, sumps and pumps, and other methods as approved in the dewatering plan as shown on the Drawings. Accumulated storm water may be discharged to the river.
- e. The Excavation Subcontractor shall provide temporary rock outlet protection at the terminus of all dewatering discharge lines that discharge to the river and other erosion-sensitive areas. This work will not be paid for separately and will be included as part of the unit price for Excavation as described in Section 01025 MEASUREMENT AND PAYMENT.

The initial dewatering sequence when using by-pass piping shall include the appropriate and relevant tasks listed above to address the dewatering of isolated pockets/pools of water.

The dewatering system shall conform to the following general guidelines:

- a. Design dewatering system to maintain water levels such that excavation is generally dry so that the work is not impeded, to limit movement of soil fines, and to allow excavation and placement of fill without damaging subgrade, subject to approval of the Engineer.
- b. Grade and ditch the site as necessary to direct surface runoff away from open excavations and subgrade surfaces.
- c. Provide and maintain temporary trenches, drain pipes, sumps, pumps, and other equipment to keep all excavations generally dry. The Excavation Subcontractor is responsible for collecting and removing all groundwater seepage, surface water runoff, and wastewater from construction activities to the wastewater treatment facility.
- d. Provide means to minimize silt and fine sand from being transported with the water to the treatment system.

- e. Provide stormwater runoff control to prevent upland runoff from entering the work area during remediation.
- f. After initial dewatering of the work area to within 6 inches of the riverbed, pumped surface water and groundwater shall be conveyed to the water treatment system. The Excavation Subcontractor shall size equipment appropriately, based on past experience on the 1.5-Mile Removal Action between Lyman Street and Dawes Avenue and the anticipated conditions for areas of the Reach between Dawes Avenue and the confluence of the East and West Branches of the River. The current water treatment system is permitted to discharge up to 500 gpm of treated water.
- g. On-site groundwater recharge pits will not be permitted.
- h. Under no circumstances place fill or concrete, or install piping and appurtenances in excavations containing standing water without permission to proceed from the Engineer.
- i. The Excavation Subcontractor shall control groundwater so as to prevent softening of the bottom of excavations, or formation of “quick” conditions or “boils” during excavation. The Excavation Subcontractor shall design, install, maintain, and operate dewatering systems so as to minimize removal of the natural soils (e.g., by “piping”).
- j. The Excavation Subcontractor shall operate dewatering pumps in the work areas so as to minimize noise and maintain compliance with the City of Pittsfield Noise Ordinance and the requirements of specification Section 01410 – ENVIRONMENTAL AND CONDITIONS MONITORING.

3.5 PREPARATION OF GROUND SURFACE FOR BACKFILL

3.5.1 General Requirements

Ground surface on which fill is to be placed shall be free of standing water; live, dead, or decayed vegetation; rubbish; debris; or 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 granular materials (e.g., gravel, riprap), 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.

3.5.2 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.

3.6 BACKFILL PLACEMENT AND COMPACTION

The Excavation Subcontractor shall obtain approval for each work area excavation prior to backfilling. Structural fill and/or 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 text:

Compaction Requirements

Backfill Type	Compaction in Percent Maximum Dry Density	Maximum Loose Lift Thickness (inches)	
		Hand-Operated Compaction Equipment	Heavy-Duty Compaction Equipment
Structural fill	95	6	12
Common fill	95	6	12
Filter material	90 ¹	6	12

Notes: Compaction testing of Filter Materials I through III is not required. Acceptance will be based on visual inspection and will be determined in the field by the Engineer.

All materials, with the exception of topsoil, shall be compacted until observed to be dense, stable, and unyielding.

Structural fill and 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. Fill placed on slopes may be accepted if the surface density is less than 95%, at the discretion of the Engineer.

Filter material soils shall be placed in horizontal, loose lifts and uniformly compacted to at least 90% of maximum density according to ASTM D 1557 Method C. Filter material placed

on slopes may be accepted if the surface density is less than 90%, at the discretion of the Engineer.

Where common fill or filter material that conforms to specified gradations is too coarse to permit testing with ASTM D 1557 Method C, the Excavation Subcontractor shall develop a compaction method that achieves a uniformly dense, stable, and non-yielding condition acceptable to the Engineer. Compaction acceptance shall be based on visual approval of the completed lift.

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.

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

The surface of each completed lift shall be scarified to a depth of approximately 3 inches prior to the placement of a subsequent lift.

3.7 GEOTEXTILES

Geotextile shall be handled, stored, and installed in accordance with the manufacturer's recommendations.

3.8 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.

3.8.1 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.

3.8.2 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.

3.8.3 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 that 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 from a source or products using the materials from that source when such materials are unsuitable in the opinion of the Engineer.

3.9 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.

3.10 PLACING TOPSOIL

On areas to receive topsoil, the compacted subgrade soil shall be scarified to a 3-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.

3.11 PLACING

3.11.1 General

Structural fill, common fill, filter material, 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 from the toe to the top of bank.

3.11.2 Base Preparation

Areas on which filter material and riprap are to be placed shall be graded and/or dressed to conform to cross-sections shown on the 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 material, the Engineer will inspect the prepared base and no material shall be placed thereon until that area has been approved.

3.11.3 Placement of Filter Material

3.11.3.1 Placement of Filter Material on Prepared Base

Filter material shall be spread uniformly on the prepared base to the slope lines and grades as indicated on the Drawings and in such manner as to avoid damage to the prepared base. Placement shall begin in the riverbed and continue up slope. Subsequent 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 material or cause mixing of adjacent materials will not be permitted. The filter material 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 filter material shall be repaired before proceeding with the work. Compaction of the filter material shall be as described previously.

3.11.4 Placement of Riprap

3.11.4.1 General

Riprap shall be placed on the filter material within the limits shown on the Drawings.

3.11.4.2 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 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 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 Drawings.

3.12 OVER-EXCAVATION

3.12.1 General

On banks, including at the toe of slope, areas that are over-excavated shall be backfilled with structural fill. Structural fill shall be placed and compacted as described herein. Within the riverbed at least 5 feet beyond the toe of slope, areas that are over-excavated may be backfilled with common fill, structural fill, or other Engineer-approved material that can be compacted to a dense, stable, and unyielding condition.

3.13 EQUIPMENT

No heavy-duty equipment, i.e., dozers, excavators, heavy-duty rollers, shall be operated on slopes.

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-Traversal (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.”
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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 and riverbank work areas during and after excavation and before restoration which could be flooded during storm events that exceed the capacity of the diversion system.

- c. Areas around the outlet ends of diversion piping in successive Phase 3 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 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 PHASE 3.

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

- a. Excavation Plan section(s) providing in-river work area erosion control measures in accordance with the requirements described in Subsection 1.4.2.3.

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 Installer's Qualifications. Include the installer's company name and address, training and experience, and/or certification.
- c. For Mulch, provide composition and source.
- d. For Asphalt Adhesive, provide composition.
- e. For Tackifier, provide composition.
- f. 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 its 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 14th 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 Stormwater and Erosion Control Methods

The Excavation Subcontractor shall prepare, as part of the Excavation Plan, 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 3 remediation. At a minimum, the information shall describe and detail the following:

- a. The phased sequencing and staging of the stormwater and erosion controls for the remediation throughout Phase 3 of the 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, articulating concrete blocks, 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. Temporary erosion controls shall be implemented at the direction of the Engineer.
 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 ft downstream of the pipe end.
- b. The 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. Articulating concrete blocks 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 articulating 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 an 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 ± 0.1
Organic Matter (oven-dried basis)	99.3% within ± 0.2
Inorganic Ash (oven-dried basis)	0.7% within ± 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 the 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 PHASE 3.

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 timeframe. 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° 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 to 1
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 articulating concrete blocks 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 Articulating Concrete Block Components

2.2.2.1 Articulating Concrete Block

Articulating concrete block (ACB) shall be as specified in Specification Section 02382 - ARTICULATING CONCRETE BLOCK REVETMENTS.

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. The filter fabric shall meet or exceed the requirements listed in Table 02382-3 or as otherwise recommended by the ACB manufacturer and approved by the Engineer.

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 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 and shall notify the General Contractor immediately when first concern of potential flooding is noted. 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 Excavation 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 Articulating Concrete Block Mats around Containment Cells and Excavations

Upon specific direction from the Engineer on a cell-by-cell basis (either sheet pile diversion cells or other work cells), the Excavation Subcontractor shall place articulating concrete block mats around the cells as directed. 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, sheet pile walls, or other in-river equipment or materials. 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, removal of adjacent sheet pile enclosures, or following 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 Excavation Subcontractor 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 Pre-Construction 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 discharged with minimal 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 ft

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 ft (uniform top elevation)
- Top Width: 3.0 - 5.0 ft
- Side Slope: 3:1 or flatter
- Required Cross-Sectional Area: 20 SF/Tributary Acre
- Material: Coarse rock or stone

2. Geotextile Fabrics

- Supported by stakes/posts as required and further supported by a netting of industrial polypropylene, if required.
- Height: As required to restrain sediment.
- Fabric: Mirafi 100 or equal.
- Toe of fabric to be buried 6 inches in native soil.

3. Hay or Straw Bales:

- Bales should be bound with twine.
- Bales should be anchored to the ground with fence posts, wood pickets, or any naturally decomposable material. Two anchors per bale are required.
- Bales shall be installed so that runoff cannot escape freely under bales.

Height 1.5 ft

Width 1.5 - 3.0 ft

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.

Final Quality Assurance Project Plan (QAPP), Weston Solutions, Inc., General Electric (GE) Housatonic River Project, Pittsfield, Massachusetts, DCN: GE-022803-ABLZ, May 2003.

1.2 POTENTIAL AREAS OF CONCERN

The Excavation Subcontractor shall be prepared to manage NAPL wherever encountered. NAPL may be encountered anywhere within the Phase 3 stretch. Based on previous investigations and remediation activities, NAPL has been identified intermittently throughout all of Phases 1 and 2 in small and large areas. Between Elm Street and Dawes Avenue, a number of test excavations were installed to approximately 2 ft below the river bottom. NAPL was encountered in many of these locations in the river bed. The presence of NAPL was confirmed during remediation, with NAPL additionally encountered at the lower bank excavations and at previously unknown or unsuspected locations. Information

on these explorations, existing conditions, and remediation activities 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.
- c. Project Monthly Reports for September 2002 through July 2004, Weston Solutions, Inc.

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 the analytical laboratory approved in the QAPP.

1.4 SUBMITTALS

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

SD-01 Preconstruction Submittals

NAPL Management Plan Addendum (to be submitted as a part of the Excavation 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

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.

1.5.2 Related Equipment and Materials

Materials and equipment such as skimmers, sorbents, sealants, and any other equipment and materials used by the Excavation Subcontractor to manage NAPL shall be listed 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 and maintenance of stockpiles. 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, 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 02300 EARTHWORK 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 Excavation Subcontractor shall construct and maintain a separate NAPL-impacted soil and sediment stockpile area on the GE property and/or at the Fred Garner Park area. 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 work area and outside the NAPL-containment area, and/or in areas outside the work area.

END OF SECTION

SECTION 02382

ARTICULATING CONCRETE BLOCK REVETMENTS

PART 1 GENERAL

1.1 DESCRIPTION

This section includes requirements for the design, construction, and all related items necessary to install an Articulating Concrete Block (ACB) revetment system for the designated coverage area at the Fred Garner Park Canoe Launch within Phase 3 of the Housatonic River Project, as shown on the Drawings.

The Excavation Subcontractor shall initially complete a detailed design of the proposed ACB system to determine all requirements for materials, subgrade preparation, bank anchorage, toe aprons and anchorage, and transitions to existing or proposed structures. The design shall be based on the parameters and values listed in Part 1.4 and other requirements described in this specification.

Upon approval of the design by the Engineer, the Excavation Subcontractor shall complete the ACB revetment system construction.

1.2 REFERENCES

The publications listed below form a part of the 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 288 Geotextiles Used for Subsurface Drainage Purposes

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C42 Obtaining and Testing Drilled Cores and Sawed Beams of
Concrete

ASTM C140 Sampling and Testing Concrete Masonry Units and Related Units

ASTM C1262 Evaluating the Freeze-Thaw Durability of Manufactured Concrete
Masonry Units and Related Concrete Units

ASTM D4355 Deterioration of Geotextiles from Exposure to Ultraviolet Light
and Water (Xenon-Arc Type Apparatus)

ASTM D4491 Water Permeability of Geotextiles by Permittivity

ASTM D4533 Trapezoid Tearing Strength of Geotextiles

ASTM D4632	Grab Breaking Load and Elongation of Geotextiles
ASTM D4751	Determining Apparent Opening Size of a Geotextile
ASTM D4833	Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D4873	Identification, Storage, and Handling of Geosynthetic Rolls

1.3 DEFINITIONS

1.3.1 Articulating Concrete Block (ACB) Revetment System

A matrix of interconnected concrete block units for erosion protection. Units are connected by geometric interlock and/or cables, geotextiles, or geogrids, and typically include a geotextile underlayment for subsoil retention.

1.3.2 Blocks

Articulating concrete block revetment units will be referred to as blocks.

1.3.3 Interlocking Blocks

Each pair of abutting blocks shall have interlocking keys that limit lateral expansion. The key and keyhole shall have an interference fit such that the joint movement has a minimum aperture at closure, and a maximum aperture when pulled apart. The joint freeplay shall allow articulation of each individual block.

1.3.4 Freeplay

Freeplay shall be the maximum lateral joint movement for interlocking blocks (difference between maximum and minimum aperture).

1.4 SUBMITTALS

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

SD-02 Shop Drawings

Design; G

The Excavation Subcontractor shall submit a design for the proposed ACB installation for the coverage area shown on the Drawings. The design will be comprised of plan drawings, cross-sections, and details necessary for the installation, as well as supporting calculations and manufacturer's performance research results demonstrating that the system can meet the hydraulic parameters

and values listed below. The design shall be based on the most critical hydraulic conditions. It should be noted that the ACB will only be extended to the limits shown on the Drawings.

**Table 02382-1
Hydraulic Design Parameters¹**

Frequency	Q (cfs)	El (ft)	V (fps)	Shear (lb/sf)	Flow Depth (ft)
1 yr	1670	964.69	4.48	0.48	7.69
1.5 yr	1761	964.87	4.57	0.50	7.87
2 yr	2,047	965.43	4.77	0.56	8.43
5 yr	3,336	967.50	4.94 ²	0.87 ²	10.50
10 yr	4,375	968.59	4.74	0.63	11.59
50 yr	7,239	972.14	3.61	0.32	15.14
100 yr	8,721	973.39	3.58	0.31	16.39

Note: ¹Hydraulic design parameters based on HEC-RAS profile developed by Weston Solutions, Inc., December 2004, taken at Station 567+00. Parameters and values derived are for the area immediately upstream of the Canoe Launch location.

²Velocity and Shear for the 5-yr storm were selected from output for Station 567+50, which is immediately downstream of the Canoe Launch location. These values are higher at Station 567+50 than 567+00.

The design shall fully address bank anchorage, toe apron, subgrade preparation (including geosynthetics), and transition details to other proposed or existing structure requirements. This includes the transition to riprap armoring on the riverbanks and the riverbed and the tie-in to the upland area. Maximum bank slope inclination shall be no steeper than 2:1 (horizontal to vertical). The bank elevation for the top of the ACB system shall be as shown on the Drawings. The Excavation Subcontractor shall complete any and all additional subsurface investigations it deems necessary to complete the ACB system design.

The design shall be sealed by a licensed Professional Engineer.

ACB Installation Details; G

Drawings shall be submitted that show details of the ACB installation. The details shall show the block layout patterns in relation to the feature alignment, anticipated locations of cast-in-place concrete joints, if any, and proposed installation methods for void filling materials.

SD-03 Product Data

ACB and Geotextile Data; G

Descriptive technical data shall be submitted on the blocks and geotextile. The submittal shall include all material properties specified under PART 2 PRODUCTS. Catalog cuts, technical data sheets, or test data shall be submitted showing that the products meet the specifications. The submittal shall also include a copy of any standard manufacturer's warranties for the products.

Anchor Pullout Capacity

The Excavation Subcontractor shall submit calculations for the anchor pullout capacity. Tabulated manufacturer's data are acceptable, if the embedment soil conditions are applicable to the project site.

SD-04 Samples

ACB Sample

At the same time as the ACB and geotextile data submittal, the Excavation Subcontractor shall submit two samples of the proposed block. The samples shall be typical of the size, texture, color, and finish. If the Engineer is familiar with the product, this submittal may be waived.

SD-06 Test Reports

Flume Test for Critical Shear Stress

At the same time as the ACB and geotextile data submittal, the Excavation Subcontractor shall submit a report of testing for the ACB. The report shall clearly state if the critical shear stress associated with the stability threshold of the ACB system was derived from laboratory testing that included a sub-block drainage layer as a component of the tested system.

1.5 SCHEDULE

To limit ultraviolet light exposure of the geotextile, the blocks shall generally be placed within 7 days after placing the geotextile, and the void filler shall generally be placed within 14 days after placing the geotextile.

1.6 DELIVERY, STORAGE AND HANDLING

The Excavation Subcontractor shall check products upon delivery to assure that the proper material has been received and is undamaged. For geosynthetics, the guidelines presented in ASTM D4873 shall be followed.

1.6.1 Blocks

All blocks shall be sound and free of defects that would interfere with proper placement or that would impair the strength or longevity of the installation. Blocks with the following defects shall be discarded:

- a. Blocks with broken appendages.
- b. Blocks with chips larger than 2 inches in any dimension.
- c. Blocks with cracks wider than 0.02 inches and longer than 33% of the nominal height.

Minor cracks incidental to the usual method of manufacture, or chipping that results from customary methods of handling in shipping, delivery, and placement will not be deemed grounds for rejection.

Blocks shall be stored in a suitable location away from mud, paint, wet cement, and other contamination or disturbance.

1.6.2 Geotextiles

1.6.2.1 Labeling

Each roll shall be labeled with the manufacturer's name, product identification, roll dimensions, lot number, and date manufactured.

1.6.2.2 Handling

Geosynthetic rolls shall be handled and unloaded by hand, or with load carrying straps, a fork lift with a stinger bar, or an axial bar assembly. Geosynthetic rolls shall not be dragged, lifted by one end, lifted by cables or chains, or dropped to the ground.

1.6.2.3 Storage

Geotextiles shall be protected from cement, paint, excessive mud, chemicals, sparks and flames, temperatures in excess of 160 degrees F, and any other environmental condition that may degrade its physical properties. If stored outdoors, the rolls shall be elevated from the ground surface. Geotextiles shall be protected with an opaque waterproof cover. Geotextiles shall be delivered to the site in a dry and undamaged condition.

PART 2 PRODUCTS

2.1 ARTICULATING CONCRETE BLOCK

In addition to the requirements resulting from the design described in Part 1.4 of this specification, the ACB shall meet the following criteria:

**Table 02382-2
ACB Requirements**

Criteria	Required Value	Test Method
Matrix Assembly: Interlocking Blocks / Cabled System		
Thickness, minimum	4 inches	N/A
Net Weight/Area, minimum	30 psf	Note a.
Critical Shear Stress, minimum	3.5 psf	Note b.
Critical Velocity, minimum	15 ft/sec	Note b.
Curvature Radius, maximum	3 feet	Note c.
Surface Void Area Ratio	25% - 40%	Note d.
Drainage Correction Factor (DCF)	20% - 35%	Note e.
Block/Geotextile Interface		
Friction Angle	35 degrees	Note f.

NOTES:

- a. The weight of the mattress per unit area shall be determined with the nominal joint spacing, in a non-submerged condition.
- b. FHWA RD-89-199 or similar procedure.
- c. The curvature radius shall be indicative of the ability of the assembled mattress to conform to one-dimensional subgrade curves without binding, such as for anchor trenches and swales. The curvature radius shall be demonstrated, if requested by the Engineer.
- d. The surface void area ratio shall be determined at the visible (with filled voids) surface of the blocks, with the joints spaced in a neutral position (50%), and shall be expressed as a percentage of the gross mat area. The void area shall include area between the blocks and open cells within the block.
- e. The drainage correction factor shall be the minimum void area ratio (usually taken at the base of the blocks), with the joints spaced in a neutral position (50% freeplay in each direction), and shall be expressed as a percentage of the gross mat area.
- f. The concrete surface shall be sufficiently rough to prevent sliding of the blocks on the geotextile. The interface friction must be matched with the selected block and geotextile combination, and shall be included with the ACB and geotextile data submittal. The block/geotextile interface friction angle shall be demonstrated, if requested by the Engineer.

2.1.1 Other Hydraulic Stability Requirements

The ACB product shall have been tested in a flume chamber, except that a drainage layer is not required. If the product was tested with a drainage layer, the installed product shall

incorporate a similar drainage layer with adequate filtration design for the site soils. The flume test shall be based on conservative assumptions for field placement of the blocks (such as block orientation and joint spacing within construction tolerances). The critical shear stress (and critical velocity) shall be indicated in the test report.

2.1.1.1 Extrapolation of Hydraulic Stability

Extrapolation of critical shear stress for untested blocks within a similar family of ACB shall be subject to limitations. Extrapolation shall only be used for blocks having a similar footprint area and interlock mechanism, but with variable thickness or net weight/area. Extrapolation shall only be accepted if the following conditions are met:

- a. The extrapolation is in strict accordance with hydraulic similitude methods commonly accepted by the industry and includes quantitative treatment for a block overturning failure mode.
- b. The tested block is the smaller product size in both thickness and net weight/area, and extrapolation does not extend the critical velocity more than 10 feet per second from the tested product size.

2.1.2 Matrix Assembly – Interlocking Blocks

Interlocking blocks are assumed to function without the use of cables or similar restraints. Void filler shall be placed to inhibit lateral movement and block pullout, cover the geotextile, and increase hydraulic stability.

2.1.3 Matrix Assembly – Cabled Systems

Cable tied concrete block shall be interconnected by flexible cables running through the blocks. Each block shall be penetrated by a cable that allows articulation of the blocks, but restrains removal of individual blocks. Void filler shall be placed to inhibit lateral movement, cover the geotextile, and increase hydraulic stability. Articulating concrete block, cables, and fittings shall be fabricated into mattresses at the manufacturer's plant or at the site with prior approval of the Engineer.

2.1.4 Structural Requirements

Articulating concrete block shall be wet cast using concrete as specified herein, or dry-cast by a vibratory block forming machine. The blocks shall be manufactured to the following requirements:

- a. The minimum compressive strength shall be 4,000 psi for an average of 3 units, and 3,500 psi for an individual unit. Compressive strength shall be determined by ASTM C42 for wet cast blocks or by ASTM C140 for dry cast blocks.
- b. The maximum water absorption for dry cast units shall be a maximum of 5 percent per block or 9 pcf for an average of 3 units, and 12 pcf for an individual unit. Water absorption shall be determined by ASTM C140.

- c. The minimum saturated surface-dry density shall be 140 for average of 3 units, and 140 for an individual unit.
- d. Wet cast concrete shall be air entrained to contain between 4 and 7% total air.
- e. For freeze-thaw durability tested in accordance with ASTM C 1262, specimens shall comply with either of the following: (1) the weight loss of each of 5 specimens after 100 cycles shall not exceed 1%; or (2) the weight loss of each of 5 specimens after 150 cycles shall not exceed 1.5%. Recent test data on identical materials may be submitted. However, the Engineer reserves the right to require additional testing.

2.2 GEOTEXTILE

The geotextile shall meet the material properties specified in AASHTO M 288 for Class 2 strength property requirements and for permanent erosion control. Filter requirements in AASHTO M 288 shall be based on in-situ soil with less than 15% passing the 0.075 mm sieve opening. Geotextile used as a filter below the ACB shall be a non-woven fabric, and shall meet the requirements specified in Table 2 unless otherwise determined by the Excavation Subcontractor. The property values (except for AOS) represent minimum average roll values (MARV) in the weakest principal direction.

**Table 02382-3
Geotextile Physical Properties**

Property	Test Requirement	Test Method
Grab Tensile, lb.	160	ASTM D4632
Tear Strength, lb.	55	ASTM D4533
Puncture Strength, lb.	55	ASTM D4833
Permittivity, 1/sec	0.5	ASTM D4491
Apparent Opening Size (U.S. Sieve)	70-100	ASTM D4751
Ultraviolet Stability	50%	ASTM D4355

2.3 CABLE

2.3.1 Installation Requirements for Cable

Cable used for preassembled mattresses shall be sufficiently sized and fastened for the size/weight of the assembled mattresses, such that the assembled mattresses can be

placed in compliance with OSHA standards. The manufacturer shall be responsible for determining the minimum cable strength compatible with the mattress size for safe handling. Cable strength shall be based on a minimum factor-of-safety of 5, and include appropriate reduction factors for mechanically crimped cable and other fasteners. If applicable, loading conditions shall include the use of a spreader bar for placing the mattresses.

2.3.1.1 Fasteners Other Than Cable

Any systems which rely on geotextiles (or other fabric integral with the mattress) to maintain block-to-block interconnection shall meet the applicable portions of this specification for cables. Geosynthetics strength shall include appropriate factors of safety, with particular attention given to the grab points.

2.3.2 Design Requirements for Cable

Articulating concrete blocks that rely on cables to maintain block to block connection shall use ropes manufactured from polyester, stainless steel wire, or galvanized steel wire as recommended by the block manufacturer.

Polyester rope shall be constructed of high-tenacity, low-elongating, continuous filament polyester fibers; and shall consist of a core construction comprised of parallel fibers contained within an outer jacket or cover.

2.3.3 Anchors

Anchors shall be selected with an ultimate vertical pullout resistance for the project site soil conditions as determined by the Excavation Subcontractor. Anchors shall be capable of being attached directly to the ACB mat in a manner which will achieve little or no slack in the cable system or gaps in the ACB mattress. Anchors shall be attached to the mat in such a manner that they will not be affected by tampering or vandalism. Anchors shall have the capability of being load-tested to the specified pull-out capacity. Anchors shall consist of hot-dipped galvanized components unless otherwise approved by the Engineer.

2.4 VOID FILLER

Based on the design developed in accordance with Part 1.4 of this specification, the Excavation Subcontractor shall recommend either an aggregate or topsoil/seed void filler (or combination thereof). It is desired that a topsoil/seed void filler be utilized to the fullest extent practical above the average annual water surface elevation on the banks of the Canoe Launch and a gravel fill material be used on the floor of the Canoe Launch area. The water surface elevation/level will be provided by the Engineer. Limits and elevations of the void filler types shall be shown on the Excavation Subcontractor's Design Drawings.

2.4.1 Aggregate

Aggregate for filling the voids in the block shall be as recommended by the Excavation Subcontractor, subject to approval by the Engineer.

2.4.2 Topsoil and Seed

Topsoil for filling the voids in the block and seed for turf establishment shall meet the requirements of Section 02300 EARTHWORK and Section 02930 BANK REVEGETATION PHASE 3.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The ACB revetment shall be placed on undisturbed, stable native soils, or on compacted structural fill or acceptably placed and compacted filter material, as shown on the Drawings. The ACB shall not be placed on surfaces that contain mud, frost, organic soils, fill that has not met compaction requirements, or where the Engineer determines that unsatisfactory material remains in or under the subgrade.

3.1.1 Clearing

All vegetation shall be completely removed as specified in Section 02230 CLEARING AND GRUBBING AND SITE PREPARATION.

3.1.2 Bank Grading

Grading shall be finished to a smooth surface, typical of that obtainable with a dozer and blade.

3.1.3 Compaction and Subgrade Finishing

Fill materials shall be compacted to the specified density in Section 02300 EARTHWORK.

3.1.4 Grade Tolerances

The grading tolerance shall be as defined in Specification 02300 EARTHWORK, with no abrupt variations that would cause unacceptable projections of individual blocks.

3.1.5 Surface Tolerances

The surface on which the ACB is to be installed shall be maintained in a smooth condition between installation of the geotextile and the blocks. Windrows, stones, clods

of cohesive soil, and irregularities shall be raked smooth. Ruts, rills, and gullies resulting from traffic, precipitation runoff, and groundwater seepage, etc. shall be corrected prior to installation of blocks.

3.2 GEOTEXTILE INSTALLATION

The geotextile shall be laid flat and smooth so that it is in direct contact with the underlying materials. The geotextile shall be free of tension, folds, and wrinkles. The number of seams and overlaps shall be minimized by selective orientation of geotextile panels, within the limitations of maintaining a consistent pattern. Geotextile shall be placed immediately prior to block installation, if necessary to limit damage to the geotextile from equipment or repeated pedestrian traffic and limit disturbance of the subgrade from precipitation or runoff.

3.2.1 Geotextile Seams

Seams shall be overlapped a minimum of 18 inches. Seams on slopes and butt end seams shall be shingled so that runoff and channel flow passes over the fabric. Geotextile panels shall be secured before block placement by adequate sandbags, spare blocks, or pins/staples.

3.3 BLOCK INSTALLATION

All placement of blocks shall be in accordance with the manufacturer's recommendations and the Excavation Subcontractor's approved Shop Drawings.

3.3.1 Placement of Pre-Assembled Mattresses

Placement of pre-assembled mattresses shall be done with mattresses attached to a spreader bar to aid in lifting, aligning, and placing the mattresses. The mattresses shall be placed directly into position, with a maximum space or gap between mattresses of 3 inches in excess of the nominal joint spacing of blocks within the mattress. Mattresses out of alignment shall be lifted and reset. Mattresses shall not be pushed or pulled laterally after they are in contact with the geotextile. No overlapping of mats will be accepted and no blocks shall project vertically more than 1 inch beyond the adjacent blocks. As adjacent mats are placed, they shall be secured to each other by fastening the protruding horizontal and vertical cable connections and end cable loops together along each side of the mats.

3.3.2 Hand Placement of Interlocking Blocks

Hand placed blocks shall be spaced to maximize the ACB ability to articulate. The Excavation Subcontractor shall use adequate alignment control, such as string lines, to keep the block pattern in alignment and the joint spacing consistent and uniform. Initially, no more than two working block rows shall progress simultaneously in the direction of placement. Additional working rows may be added after experience shows that true lines are maintained. The starting position for ACB placement shall be a

convenient location for control of the block pattern alignment. The Engineer shall approve of the starting position for placement of the ACB.

3.3.2.1 Target Joint Spacing

Interlocking blocks shall be installed with a uniform aperture in the interlocking connections. The target joint spacing shall be neutrally spaced with equal free-play for the joint to open and close.

3.3.2.2 Correction of Joint Spacing

If the block pattern becomes skewed to an extent that blocks bind, joints close, or blocks stick up, then the placed ACB that is determined to be out of tolerance shall be removed and replaced. Where the nonconformance of the joint spacing is due to project features, such as warped slopes or anchor trenches, then cast-in-place concrete joints shall be field located in concurrence with the Engineer.

3.3.2.3 Maintenance of Joint Spacing

If the block pattern becomes skewed to an extent that the joint freeplay is not acceptable to the Engineer, then cast-in-place concrete joints shall be field located as directed by the Engineer.

3.3.2.4 Block Layout Pattern Dependent on Project Features

If the block pattern is shown to be maintained parallel and perpendicular to selected project features, such as the toe of channel slopes, then field location of cast-in-place concrete joints shall be implemented as needed and as directed by the Engineer.

3.3.3 Tolerances

Maximum acceptable block projections (vertical offset from adjacent blocks) for "installation in the dry" shall not exceed 0.5 inches for interlocking blocks or 1.0 inch for cabled systems. Typical block projections shall be less than half the maximum projections.

3.4 ANCHORS

Anchors shall be carefully positioned for attachment to the ACB. Rigid shafts shall align with the ACB cables. Flexible anchors (cables, etc.) shall be linear between the ACB fastener and the restraining device before tensioning. Penetrations in the geotextile to allow for penetration of the anchor shall be sealed.

3.5 CONCRETE JOINTS

Use of cast-in-place concrete joints shall be minimized to the extent practicable. The Engineer shall be informed of all concrete joints not shown on Shop Drawings prior to field placement. Joints that shall require concrete include:

- Joints between cable tied mattresses where the joint is 3 inches wider than the nominal joint.
- Joints where block interlock is discontinuous.
- Abutments where the ACB meets headwalls, pipe penetrations, and/or walls.
- Any areas where there are partial blocks to avoid small blocks with reduced hydraulic stability.

Field placed concrete shall be proportioned for similar strength and durability properties as the ACB concrete, and shall meet applicable portions of Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. All cable ties and anchoring shall be completed prior to placing concrete.

3.5.1 Abutments

The ACB shall abut pipe outlets, retaining walls, head walls, and other abutments in a neat appearance. Unless a specific detail is indicated on the Drawings, voids shall be filled with partial blocks and the gap shall be filled with cast-in-place concrete. The concrete shall be installed flush with the surface of the blocks and shall be float finished.

3.6 VOID FILLER

The voids of the ACB mats shall be filled with aggregate void filler as appropriate. All cable ties and anchoring shall be completed prior to filling voids.

3.7 PROTECTION OF WORK

Work shall be protected against damage from subsequent operations. Displaced or broken blocks shall be removed and replaced to conform to all requirements of this section. Damaged material shall not be incorporated. Equipment shall not be allowed on the ACB that could crack, cause abrasion, or otherwise damage the blocks.

3.7.1 Construction Equipment

Vehicles shall not operate directly on geotextile, except that rubber tired vehicles may operate directly on short reaches of geotextile that meets or exceeds AASHTO M 288 survivability requirements for Class 1 geotextile, if there is no rutting, if the vehicle access is necessary to accomplish the work, and if the Engineer observes the operation and approves. Vehicles shall not operate on the ACB until (during or after) placement of void filler. Vehicle traffic on the ACB shall be restricted to light weight rubber tired vehicles and where intermittent access is necessary to accomplish the work. Routine haul routes shall not be established on the ACB. These allowances shall not waive the Excavation Subcontractor's obligation to maintain the installation until acceptance and verify that vehicle access does not crack, or in any way damage, the ACB.

3.8 QUALITY CONTROL TESTING

The following testing shall be performed independent of the manufacturing process by an agency other than the manufacturer. The ACB blocks shall be sampled and tested for compressive strength, water absorption, and unit weight. The sample frequency shall be three specimens for each 3,000 square yard or fraction thereof. Test methods shall be consistent with those specified in PART 2 PRODUCTS.

END OF SECTION

SECTION 02450
GEOCELL SYSTEM

PART 1 GENERAL

Work covered by this section includes the supply and installation of a geocell system to support restoration work within Phase 3 as shown on the Drawings. The work consists of placing and securing a geocell system on the restored slope and backfilling the geocell 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 geocell 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 geocell 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 geocell system used for slope protection shall be backfilled with topsoil.

END OF SECTION

SECTION 02464

SHEET PILE CONTAINMENT CELL CONSTRUCTION AND DEWATERING

PART 1 GENERAL

Work covered by this section includes furnishing, installing, dewatering, maintaining, and removing sheet pile containment cells (or “cofferdams”) as shown on the Drawings. The containment cells shall be constructed and dewatered to enable remediation work within the cell and bank restoration construction along the riverbank to be accomplished in dry conditions.

Dewatering shall be accomplished with sumps and pumps for accumulated groundwater and surface water leakage, and sheet pile isolation units, sumps, and pumps for stormwater outfalls that discharge to the containment cells, and/or such other means selected and designed by the Excavation Subcontractor and acceptable to the Engineer. The Excavation Subcontractor shall be solely responsible for all measures needed to remove water and maintain dry conditions inside each cell for the duration of work within each containment cell so that the work is not impeded. Dewatering shall include pumping water from each cell to discharge to the river or the water treatment system as specified. All dewatering activities are incidental to containment cell construction, with the exception of the management of stormwater entering excavation cells through swales, ditches, outfalls, etc. This item is a separate payment item as defined in the Section 01025 MEASUREMENT AND PAYMENT.

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 A 6/A 6M	General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 328/A 328M	Steel Sheet Piling
ASTM A 572/A 572M	High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 690/A 690M	High-Strength Low-Alloy Steel H-Piles and Sheet Piling for Use in Marine Environments

1.2 SUBMITTALS

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

SD-01 Dewatering Plan

A dewatering plan shall be submitted as part of the Excavation Plan (see Section 02300 EARTHWORK) prior to the start of dewatering for each containment cell. The plan shall show the location of all pumps, sumps, pipelines, sediment filters, sedimentation basins, and other equipment necessary. The plan shall include the locations of all stormwater outfalls that terminate within the limits of excavation, including the elevation of the outfall terminus. The plan shall include a list of the products to be used for dewatering, subject to the approval of the Engineer and the Government. The piping materials, route to discharge to the river, location of the outfalls and sheet pile isolation units around the outfall, and route to the water treatment system shall also be included in the plan. The plan shall include methods to minimize leakage of river water into the containment cells and to prevent the collection and 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.

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. Written justification for the selection of a particular sheet pile section, including supporting documentation requested by the Engineer, shall be provided. The Engineer reserves the right to reject a particular sheet pile section proposed by the Excavation Subcontractor, if in the opinion of the Engineer, the proposed sheet pile section cannot be efficiently installed at the site given the anticipated dense soils that are likely to be encountered.

SD-03 Containment Cell Plan

A plan shall be submitted prior to the start of driving sheets for each containment cell. The plan shall show the schedule for driving, proposed cell layout, sequence of pile installation, installing and removing temporary erosion control as specified in Section 02370 STORMWATER AND EROSION CONTROL: IN-RIVER WORK, and location of “Y”, “T”, or “+” intersection piles. The plan may be modified and resubmitted as work proceeds in the event the Excavation Subcontractor elects to revise work described in the plan.

SD-06 Test Reports

PCB wipe sample results for sheet piles

1.3 SUBSURFACE DATA

Logs of test borings and observation wells are included in the Pre-Design/Design Analysis for Phase 3. The Excavation Subcontractor shall use this information at its 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 and dewatering the sheet pile containment cells.

1.4 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.

1.5 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 shall apply.

Excavation support systems shall allow unobstructed excavation of impacted material and the placement of backfill material. Furnish sufficient lateral reaction to maintain stability of soil and adjacent structures. Pre-stress bracing system to predetermined loads until the necessary lateral reaction is produced, or by such other methods as may be necessary to control displacement of ground and movement of adjacent structures. Do not use existing structures to provide reaction against lateral pressure.

1.6 USE OF WATER TREATMENT SYSTEM

The water treatment system will be sized for 400 gpm capacity. The Excavation Subcontractor shall adjust containment cell size or make other work modifications to avoid delivering water to the treatment system at any greater rate.

The Excavation Subcontractor shall take reasonable care to prevent collecting and discharging water containing suspended sediment to the treatment system using methods identified in the Dewatering Plan.

PART 2 PRODUCTS

2.1 METAL SHEET PILING

Based on work completed within upstream reaches, medium to heavy-duty sheet pile sections will be required to permit installation of the sections into the dense subsurface soils. Sheet piling to be installed in each Reach shall have a minimum section modulus as indicated in Table 1 on Drawing 1021 and shall be constructed from ASTM A572, Grade 50 steel, supplied in 30-ft lengths. The Excavation Subcontractor is advised that hard driving conditions are anticipated and that heavier sheet pile sections may be required. Sheet piling with a section modulus of 48 in³/ft has been successfully used in previous Reaches. The Excavation Subcontractor shall be responsible for selecting a sheet pile section with a section modulus at least equal to the values presented in Table 1 on Drawing No. 1017, that can be efficiently installed in anticipated subsurface soils. 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. 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 sheet pile cells and adjacent arcs composed of pilings from different manufacturers shall be "Y", "T", or "+" sections fabricated from the respective manufacturer's pilings. Fabricated Ts, Ys and + 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. Pulling holes located below Design Elevation shall be plugged temporarily to prevent infiltration of river water to the work area.

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.

2.3 DEWATERING SYSTEM

The dewatering system shall consist of pumps, sumps, pipelines, sediment filters, sedimentation basins, and other equipment necessary for the collection, removal, and disposal of surface water and groundwater within each containment cell. Dewatering shall be accomplished with sumps and pumps, and/or such other means selected and designed by the Excavation Subcontractor and acceptable to the Engineer.

2.4 TESTS, INSPECTIONS, AND VERIFICATIONS

Requirements for material tests, workmanship, and other measures for quality assurance shall be as specified.

2.4.1 Pipeline Tests and Inspection

The Excavation Subcontractor shall test all piping prior to dewatering each containment cell under the direction of the Engineer. The Excavation Subcontractor shall initiate dewatering of each containment cell upon approval of the Engineer.

Piping shall be inspected in accordance with Paragraph INSPECTIONS. Close attention shall be paid to leakage of the pipes. The Excavation Subcontractor will conduct daily inspections of the piping system and necessary repairs shall be accomplished promptly at the direction of the Engineer. Damages caused by construction traffic or other activity must be repaired before dewatering continues. When the piping is no longer required for the containment cell, the pipes shall be removed, transported to the decontamination area, and pressure-washed subject to the approval of the Engineer. After inspection and approval by the Engineer, the pipes shall be returned to the work area, or stored in a designated on-site area. The soil disturbed by the piping shall be seeded and mulched as directed by the Engineer in accordance with the specifications.

PART 3 EXECUTION

3.1 CONTAINMENT CELL INSTALLATION

Containment cells shall be installed in the sequence shown on the plans to reduce risk of contaminated sediment from being conveyed into and recontaminating an area that has already been remediated and to maximize the capacity of the unbypassed portion of the river adjacent to each excavation cell. This proposed sequence can be revised with Government approval.

The cells are constructed in the same chronology as they are numbered, i.e., 25-26-27-28-29-29A-30-30A-31-32-33-34-35-35A-36-36A-37-37A-38-38A-39-40-41-42.

After contaminated sediment has been removed and a cell has been backfilled, dewatering within the cell shall be stopped, thus allowing water to fill up the cell. If the next cell to be constructed is a cell on the other side of the river, then the downstream sheets shall be driven

to the mudline followed by the removal of the upstream sheets. If the next cell to be constructed is the downstream cell on the same side of the river, then the cell shall be allowed to fill with water and the upstream sheets shall be removed; the downstream sheets shall remain in place to form the upstream wall of the next cell. Do not remove piles along the center of the river until cells on both sides have been cleaned and backfilled. Piles on the downstream side of a cleaned cell, which have been driven to the mudline, may be pulled up to form the upstream wall of the adjacent downstream cell on the same side. Dewatering duration and removal of the sheet piles for these cells shall follow the same procedure as described above.

Relative to the sheet pile installation, the term “design elevation” refers to the minimum required elevation of the top of the sheet pile wall at the upstream wall that forms one side of the containment cell. The design elevation shall apply to a minimum of one pair of sheetpiles so that remaining sheets can remain at higher elevations without cutting as long as required toe elevations have been achieved. The design elevation will control flooding of the sheetpile cells, which is critical to maintain required factors of safety. The design elevations are indicated in Table 1 and have been selected based upon several factors including minimizing work stoppages due to flooding wall construction costs and allowable stickup based on geologic conditions. The design elevation may be revised by the Engineer, subject to the approval of the Contracting Officer, prior to or during construction based on availability of additional data on subsurface conditions, progress of sheet pile installation, the potential for NAPL, cost considerations, schedule impacts, and the time of the year the containment cells are expected to be utilized. Sheetpile design and installation requirements are summarized on Table 1 on Drawing 1021 – SHEETPILE INSTALLATION DETAILS.

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. The Excavation Subcontractor shall review all available subsurface data and drawings in order to gain an understanding of the soil conditions and the location of utilities. The Excavation Subcontractor shall expose all existing utilities that could be impacted by pile driving activities and verify their locations prior to placing and driving sheet piling. The Excavation Subcontractor shall repair any damage incurred during the work at no additional cost to the General Contractor.

The Excavation Subcontractor is advised that due to low-overhead clearance at the Pomeroy Bridge, the use of conventional driving equipment may not be possible and an alternate method of constructing water-tight containment cells may be required. Likewise, at both underground and overhead utility crossings, alternate methods and materials may be required

to construct water-tight containment cells. The Excavation Subcontractor shall address the construction of alternate cell in such areas in the Excavation Plan.

3.1.2.1 Placing

Pilings to be placed in containment cells and connecting arcs 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.

The Excavation Subcontractor shall locate the exact position of all utilities that cross the river within Phase 3 and shall expose the top of the utility or encasement prior to installing sheet piling. When locating utilities, the Excavation Subcontractor shall expose a portion of the utility or concrete encasement, as appropriate. If the location of a utility is significantly different from that depicted on the Drawings, the Excavation Subcontractor shall immediately notify the Engineer.

3.1.2.2 Driving

Prior to driving pilings in water, 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 and notify the Engineer to permit re-analysis of the conditions encountered. If the targeted embedment depth cannot be achieved as a result of encountering an isolated obstruction, the Excavation Subcontractor shall try to remove the obstruction using a spud or heavier driving sheet if this course of action is approved by the Engineer. When obstructions have been encountered, any further driving shall be conducted with extreme caution. Continuous monitoring and review of vibrations by the Engineer will be required so that allowable velocities are not exceeded and excessive vibration is not encountered.

It is anticipated that sheet pile embedment will be limited between approximately Stations 553+00 to 557+50 and 560+00 to 565+00. The Excavation Subcontractor shall drive test piles within these areas immediately following completion of cells 3/4 and 7/8. The Excavation Subcontractor shall notify the Engineer at least 2 days in advance of initiating test driving activities. The Excavation Subcontractor shall place marks on each test pile spaced at a distance of 1ft, shall mark each 5-ft increment, and shall assist the Engineer in determining the embedment depth, i.e., the depth the pile is installed below the riverbed and the location (Station) at which the test pile is installed. Test piles shall be installed at a

spacing of no greater than 20 ft unless otherwise approved by the Engineer. The Engineer will evaluate the data and modify the requirements of this specification accordingly.

If the Excavation Subcontractor determines that pilings can be driven deeper than the anticipated embedment depth between approximately Stations 553+00 to 557+50 and 560+00 to 565+00, the Excavation Subcontractor shall drive the sheets until refusal or a stickup height of 12 ft is achieved as measured from the riverbed. The Excavation Subcontractor shall record the embedment depth of each pile pair if greater embedment depths can be achieved. The Engineer will provide revised weir elevations, which the Excavation Subcontractor shall set or reset as necessary based on the actual embedment depth(s) achieved.

On the upstream side of each cell, a minimum of two sheet piles (one pair) shall be driven to the required top-of-sheet pile design elevation as directed by the Engineer. The purpose of this elevation control is to allow flooding of each containment cell at the proper elevation so as not to compromise factors of safety which could result in sheet pile failure. The Excavation Subcontractor may adjust the location of the sheetpile pair that controls flooding with the approval of the Engineer. If the flooding pair is not located at the upstream end of the cell, the design flooding elevation will need to be decreased based on the Engineer's approval.

Sheet piles shall not be driven within 100 ft of concrete less than 7 days old.

Driving sheet piling within 20 ft of any utility that crosses the river will be completed in the presence of the Engineer. The Engineer reserves the right to restrict/terminate sheet pile installation within 20 ft of any utility based on vibration monitoring results. In no case shall sheet piling be installed any closer than 5 ft from the edge of a utility. Refer to Specification Section 01410 ENVIRONMENTAL AND CONDITIONS MONITORING for vibration monitoring requirements. The Excavation Subcontractor shall construct and dewater a water-tight cell along the river centerline, directly above a utility, within which the Engineer can place and monitor a seismograph during driving operations within 20 ft of a utility. The Excavation Subcontractor shall coordinate the location and construction of the cell with the Engineer and shall ensure the cell remains water-tight during monitoring activities.

3.1.3 Splicing

Pilings driven below the required top elevation and pilings damaged by driving and cut off to permit further driving shall be either pulled back up or extended by splicing as required to reach the top elevation by splicing when directed at no additional cost to the Government.

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 DEWATERING AND CONVEYING

The initial dewatering sequence shall include the following tasks:

- a. Pump the water from within the containment cells using a pump intake and flow rate to minimize suspending and entraining solids.
- b. Water pumped from within the containment cells shall be discharged to the river until 6 inches of water remains in the containment cell near the pump intake.
- c. Water pumped from the containment cells shall be routed to the treatment system when the water depth in the containment cell is decreased to 6 inches, or if the Engineer determines that excess turbidity or sheens are visible in the water discharged from the containment cell.
- d. The Excavation Subcontractor shall isolate the terminus of outfalls from the work area within the containment cells using sheet pile, sumps and pumps as shown on the plans. Accumulated stormwater may be discharged to the river. This work will be paid for separately under a lump sum item, Stormwater Management, as described in Section 01025 MEASUREMENT AND PAYMENT.
- e. The Excavation Subcontractor shall provide temporary rock outlet protection at the terminus of all dewatering discharge lines that discharge to the river and other erosion-sensitive areas. This work will not be paid for separately and shall be included as part of other payment items as appropriate.

The dewatering system shall conform to the following general guidelines:

- a. Design dewatering system to maintain water levels such that excavation is generally dry so that the work is not impeded, to limit movement of soil fines, and to allow excavation and placement of fill without damaging subgrade, subject to approval of the Engineer.
- b. Grade and ditch the site as necessary to direct surface runoff away from open excavations and subgrade surfaces.
- c. Provide and maintain temporary trenches, drain pipes, sumps, pumps, and other equipment to keep all excavations generally dry. The Excavation Subcontractor is responsible for collecting and removing all groundwater seepage, surface water runoff, and wastewater from construction activities to the wastewater treatment facility.

- d. Provide means to minimize silt and fine sand from being transported with the water to the treatment system.
- e. Provide stormwater runoff control to prevent upland runoff from entering containment cell during remediation.
- f. After initial dewatering of the containment cell to within 6 inches of the riverbed, pumped surface water and groundwater shall be conveyed to the water treatment system. A steady-state flow rate of about 300 gpm was encountered during similar operations completed in the Upper Half-Mile, within Phase 1, and in the Transition Area.
- g. On-site groundwater recharge pits will not be permitted.
- h. Under no circumstances place fill, place concrete, or install piping and appurtenances in excavations containing standing water without permission to proceed from the Engineer.
- i. The Excavation Subcontractor shall control groundwater so as to prevent softening of the bottom of excavations, or formation of “quick” conditions or “boils” during excavation. The Excavation Subcontractor shall design, install, maintain, and operate dewatering systems so as to minimize removal of the natural soils (e.g., by “piping”).
- j. The Excavation Subcontractor shall operate dewatering pumps in the containment cells so as to minimize noise and in compliance with Specification Section 01410 ENVIRONMENTAL AND CONDITIONS MONITORING.

3.3 DRIVING SHEET PILINGS TO MUDLINE

Driving the pilings to the mudline shall conform to the following general guidelines:

- a. Pilings shall be driven to the mudline in the sequence described earlier in this Section and as shown on the plans, unless obstructions are encountered. If obstructions are encountered, the Excavation Subcontractor shall immediately notify the Engineer, who will then decide upon a course of action.
- b. Pile driving equipment shall be selected by the Excavation Subcontractor as needed to complete the job.
- c. After contaminated sediment has been removed and a cell has been backfilled, dewatering shall stop, allowing water to fill the cell. At cells where the next cell in the sequence is on the opposite side of the river, the Excavation Subcontractor shall drive the downstream side pilings down to within approximately a foot of the mudline.
- d. Prior to driving pilings, the Excavation Subcontractor shall note the profile of the bottom elevation (see 3.1.2.2 Driving) and report to the Engineer the driving depth for the pilings.

- e. The upstream sheet pilings shall be removed after the downstream sheet piles have been driven to the mudline.
- f. Maintain continuity of interlocks between the sheeting driven to the mudline and sheeting left as part of the cell where work is occurring. Provide restraint at the transition between cells to prevent the sheeting designated to remain at full height from being driven deeper by the adjacent sheet driven to the mudline.
- g. In all cases when obstructions have been encountered and sheeting cannot be driven to within 1 ft of the mudline, the Excavation Subcontractor shall stop work and immediately notify the Engineer. The Engineer will then determine if sheeting can be left at a higher elevation, if obstruction removal is required, or if the sheets need to be removed and re-installed later. Work shall proceed only once the Engineer has approved a course of action. The Excavation Subcontractor shall proceed with extreme caution so as not to exceed vibration monitoring requirements.

3.4 PULLING SHEET PILINGS FROM MUDLINE

Pulling the sheet pilings from the mudline shall conform to the following general guidelines:

- a. Pilings shall be pulled from the mudline in the sequence described earlier in this Section and as shown on the plans.
- b. Pile pulling equipment shall be selected by the Excavation Subcontractor as needed to complete the job.
- c. Pilings shall be pulled from the mudline to the elevation shown on the plans after all pilings on the opposite side of the river are either removed or driven to the mudline.
- d. Prior to pulling pilings, the Excavation Subcontractor shall note the profile of the bottom elevation (see 3.1.2.2 Driving) and report to the Engineer the required pulling distance for the pilings.
- e. Maintain continuity of interlocks between the sheeting pulled from the mudline and sheeting driven to the mudline. Provide restraint at the transition between cells to prevent the sheeting driven to the mudline from being raised up by the sheeting being pulled from the mudline.
- f. For Containment Cells 6, 8, 10, and 12, the Excavation Subcontractor shall pull the upstream pilings to the design elevation prior to installation of the downstream pilings to the design elevation.
- g. After the pilings have been pulled to the elevation shown on the plans, the Excavation Subcontractor shall inspect the interlocked joints of pulled pilings extending above ground. Pilings that do not interlock shall be repaired or replaced upon approval by the Engineer.

3.5 REMOVAL AND DECONTAMINATION/REUSE OF SHEET PILING

Removal of the sheet piling shall conform to the following general guidelines:

- a. Piling shall be removed from the river in the sequence as shown on the plans.
- b. Pile pulling equipment shall be selected by the Excavation Subcontractor as needed to complete the job.
- c. Piling along the centerline of the river shall be removed after the containment cells on both sides of the river are excavated and backfilled.
- d. Maintain integrity of sheeting left in place during removal. Provide restraint as required to prevent upward or downward movements of the sheets designated to remain during removal of sheeting.
- e. Between uses and at the end of the project and prior to being taken off-site, the sheet piles shall be removed, transported (by the General Contractor) to a decontamination area established by the General Contractor, and pressure-washed subject to the approval of the Engineer. Removal of loose material using shovels, brooms, or other appropriate equipment shall be conducted prior to pressure washing. At the end of the project, following decontamination, wipe testing of the sheets for PCBs shall be conducted as described in Section 02111 HANDLING OF EXCAVATED MATERIAL AND BACKFILL by the General Contractor, and testing results documenting compliance with the established PCB standard will be provided to the Government by the General Contractor.

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 the temporary sheet pile containment cells, necessary pumps, sumps, pipelines, sediment filters, sedimentation basins, and other equipment of collection, removal, and disposal of surface water and groundwater within each containment cell by performing routine inspections to determine condition and effectiveness, by repair of damaged or non-working sheet pile containment cells (including all related excavation support system components), and other protective measures.

3.7 INSPECTIONS

3.7.1 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 to be incorporated into the General Contractor's daily CQC Report. A copy of the inspection report shall be maintained on the job site.

3.7.2 Monthly Inspection Report and Certification Form for Sheet Pile Containment Cells

On the first working day of each month, the Excavation Subcontractor shall complete, sign, and submit a monthly Inspection Report and Certification Form for Sheet Pile Containment Cells to the Engineer. The report shall include the inspection reports from Subsection 3.7.1 Inspection Reports and include a description of the damage, repairs, and actions taken to modify or improve the containment cells or dewatering process during the previous month. When submitted to the General Contractor, the Monthly Inspection Report will be incorporated into the General Contractor's Daily CQC Report.

END OF SECTION

SECTION 02930

BANK REVEGETATION PHASE 3

PART 1 GENERAL

1.1 SECTION INCLUDES

This Section includes specifications for restoring the riverbank vegetation at the project site subsequent to excavation. As shown on the project Drawings, bank restoration methods include using a hard structure riverbank toe with revegetation treatments occurring upslope to the top of the riverbank. Revegetation treatments for each specific property will require property owner approval before implementation. Adjustments may be required to the revegetation mix to gain property owner concurrence.

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 and shrubs. 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, in accordance with the plans and specifications and as implemented under the direction of the Engineer.

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. The restoration specialist's qualifications must include at least five years of experience in the design and implementation of similar revegetation projects and an undergraduate degree in a science pertinent to the proposed restoration work (e.g., hydrology, botany, biology, civil engineering).

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.

Invasive Plant Control; G

The Invasive Plant Control Plan shall describe the sequence of treatment work, species to be treated, and estimated date of implementation during the plant establishment period. If a herbicide is to be used, the plan shall include the herbicide trade name, Environmental Protection Agency (EPA) registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, methods of application, area treated, amount applied, the name and state license number of the state certified applicator, Spill Prevention Control and Countermeasures Plan, and proposed weather conditions needed for application.

Invasive plants are plants that have spread into native or minimally manage plant systems in Massachusetts. These plants cause economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems. Invasive plants referred to in this document are those plants listed in *A Guide to Invasive Plants in Massachusetts* that present the greatest threat to native plant communities (Weatherbee, P.B., P. Somers, and T. Simmons. 1998. Massachusetts Division of Fisheries and Wildlife).

SD-07 Certificates; G

Plant Material
Seed Mix
Erosion Control Blankets
Mulch Mats
Fertilizer
Compost
Herbicide

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 and Mulch Mats: 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.
- f. Herbicide: EPA registration number and registered uses.

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 (i.e., state) of origin 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°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 SUBMITTALS 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.

1.4.1.4 Herbicide Material

Herbicide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses.

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 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 Herbicide Storage

Herbicide solutions shall be prepared off site prior to application. During application periods, herbicides shall be stored according to manufacturer's instructions by the Planting Subcontractor and be stored away from planting stock and other planting operation material. Herbicides shall not be stored within the project area during the Plant Establishment Period.

1.4.3.3 Other Material Storage

Storage of other material shall be in designated areas. Seed, soil amendments, erosion control blankets, and mulch mats 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 plants 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 installation of plants shall not be more than 30 days.

1.5 WARRANTY

Each responsible Planting Subcontractor shall warrant 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 warranted to be in a healthy and vigorously growing condition for the calendar time period specified in Subsection 3.6 PLANT ESTABLISHMENT PERIOD. 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 Subsection 2.1 PLANT MATERIAL and Subsection 3.6 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 and shrub 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 02930-1 contains a list of the tree and shrub species to be installed where plant material is specified. Each of the indicated species is native to the project area/region and has demonstrated high survivorship rates based on revegetation results upstream of the project area. The species listed shall be installed in two planting zones along the riverbank (i.e., Upper and Lower Planting Zones).

The Lower Planting Zone is defined as the riverbank area between the top-of-riverbank armor to the 5-year flood stage elevation. The Upper Planting Zone is defined as the riverbank area above the 5-year flood stage elevation to the limit of remediation. The 5-year flood stage elevation varies by station and shall be provided by the Engineer to the planting subcontractor prior to plant installation.

Within each of these planting zones approximately 75% of the tree species planted shall be primary species and 25% shall be associate species as described in Table 02930-1. Shrub

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.

species shall be equally distributed and planted in clumps, except for red-osier dogwood (*Cornus sericea*), which shall be planted in a band just upslope of the riverbank armor as shown on the project Drawings.

Table 02930-1

Tree and Shrub, Species To Be Used for Plantings

Planting Zones	Trees	Shrubs
Bank Armor	No Tree Plantings	No Shrub Plantings
Lower Bank	<u>Primary</u> : Black willow (<i>Salix nigra</i>) and silver maple (<i>Acer saccharinum</i>). <u>Associates</u> : Eastern cottonwood (<i>Populus deltoides</i>) and box elder (<i>Acer negundo</i>).	<u>Band</u> : Red-osier dogwood (<i>Cornus sericea</i>). <u>Clumps</u> : Silky dogwood (<i>Cornus amomum</i>), northern arrowwood (<i>Viburnum dentatum</i>), choke cherry (<i>Prunus virginiana</i>), and winterberry holly (<i>Ilex verticillata</i>).
Upper Bank	<u>Primary</u> : Eastern cottonwood and box elder. <u>Associates</u> : Black willow and silver maple.	<u>Clumps</u> : Northern arrowwood, winterberry holly, silky dogwood, and choke cherry

2.1.3 Types, Sizes, and Planting Distribution

As shown on the project Drawings, there are two types of riverbank revegetation methods: Straight Revegetation (plantings and topsoil) and Geoweb Revegetation (plantings, topsoil, and Geoweb). Table 02930-2 provides details on the plant sizes and installation densities and distribution for the Straight Revegetation areas. Geoweb Revegetation uses these same specifications except the overall planting density for trees shall be 500 plants per acre.

Table 02930-2

Types, Sizes, Installation Densities, and Distribution for Plantings Installed in Bank Revegetation Areas

Specification	Trees	Shrubs
Plant Type	Container-Grown (1-gal pot minimum)	Container-Grown (1-gal pot minimum)
Size at Planting	4 to 6 feet in height	2 to 3 feet in height
Planting Distribution	Unevenly-spaced rows parallel to river, with plants placed approximately 8' on center.	All shrubs except red-osier dogwood shall be installed in unevenly-spaced rows within 15' x 60' oblong clumps. Shrubs within clumps are to be spaced on 4' 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 8' on center.
Overall Planting Density	700 plants per acre	730 plants per acre

2.1.4 Plant Schedule

The plant schedule shall provide botanical 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.

2.1.10 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 6 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.

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. The seed mixture shall have a weed seed content less than 0.40% by weight, an inert material content less than 8% by weight, and be free of all invasive plant seeds as listed by the State of Massachusetts².

2.3.2 Seed Mixture

² Invasive plant seeds are those plants listed in Weatherbee, P.B., P. Somers, and T. Simmons. 1998. A Guide to Invasive Plants in Massachusetts. Massachusetts Division of Fisheries and Wildlife.

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
<i>Elymus riparius</i>	stream bank wild rye	25
<i>Elymus canadensis</i>	Canada wild rye	15
<i>Panicum clandestinum</i>	deer-tongue	15
<i>Poa palustris</i>	fowl bluegrass	10
<i>Agrostis stolonifera</i>	creeping bentgrass	10
<i>Desmodium canadense</i>	showy tick-trefoil	6
<i>Polygonum pensylvanicum</i>	Pennsylvania smartweed	5
<i>Asclepias syriaca</i>	common milkweed	2
<i>Solidago canadensis</i>	Canada goldenrod	2
<i>Solidago patula</i>	rough leaved goldenrod	2
<i>Solidago rugosa</i> var. <i>rugosa</i>	wrinkled goldenrod	2
<i>Aster puniceus</i>	bristly aster	2
<i>Aster lateriflorus</i>	calico or golden aster	1
<i>Aster macrophyllus</i>	big-leaved aster	1
<i>Verbena hastata</i>	blue vervain	1
<i>Eupatorium maculatum</i>	spotted joe-pye weed	1
		100

If needed for temporary erosion control, a nurse crop of annual rye-grass (*Lolium temulentum*), or equivalent as approved by the Engineer, can be added to the seed mixture. The annual rye-grass shall be added as a separate item to the seed mixture and shall not exceed 10% by weight of the seed mixture applied (0.1 lb/1,000 square feet).

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 commercial grade 12-month minimum slow release, tablet 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 – 60% organic matter content, 0.5 – 2.0% total kjeldal nitrogen content, 6.5 – 7.5 pH, maximum particle size less than 1 inch, and a conductivity of less than 5 mhos/cm.

2.5 MULCH MAT

A mulch mat shall be placed around all installed plants at the time of installation. The intent is to allow the mulch mat to provide weed and soil moisture control to benefit the installed plant. The mulch mat shall be made of 100% biodegradable material such as coir, wood fiber, or wool, and have a functional longevity of 2-3 years. The mulch mat size shall be 20 inch X 20 inch and conform to the following minimum specifications:

ASTM Standards	Specification
D3776 Mass/Unit Area Minimum	1.1 lbs/sy
D1777 Minimum Thickness	0.25 inches

2.6 WATER

Unless otherwise directed, watering of planted stock and seed shall be the responsibility of the General Contractor. The source of water shall be the Housatonic River adjacent to the specific planting area(s) being watered.

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 – 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

ASTM Standards	Specification
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 6 inches (152 mm). 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 inches and shall have serrations for holding it securely in the soil, and 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 HERBICIDE

The use of herbicides shall be allowed during the Construction and Plant Establishment Periods covered under this specification to control invasive plants within planting areas or within 25 ft of planting areas. The herbicide material shall be EPA registered and approved.

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 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 effectively and efficiently.

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; installing erosion control blankets; planting trees and shrubs, installing mulch mats; and maintaining herbaceous cover and plantings 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 seeding³. 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.

If needed for temporary erosion control, a nurse crop of annual rye-grass, or equivalent as approved by the Engineer, can be added to the seed mixture. The annual rye-grass shall be added as a separate item to the seed mixture and shall not exceed 10% by weight of the seed mixture applied (0.1 lb/1,000 square feet).

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 Installation of Erosion Control Blankets.

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 EROSION CONTROL BLANKETS,

³ If a nurse crop of annual rye-grass or equivalent is used, it shall be added in addition to the 1 lb/1000 sf seed mixture that is applied.

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.

Plants installed in the Geoweb Revegetation area 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 – 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.

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 tablets shall be added to the planting pit between the bottom of the rootball to no higher than 1/3 of the way up the rootball. The tablets shall be spaced equally around the perimeter of the rootball. The number of tablets used for each plant shall correspond to the manufacturer's specified quantity for 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. If compost is utilized, the backfill material shall contain 25 to 30% compost and be well mixed with the existing topsoil prior to backfilling.

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 1/4-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. As shown on the project Drawings, a soil berm shall be constructed on the downslope side of the installed plant to help retain moisture. The erosion blanket shall be folded back over the soil berm in a similar position prior to plant installation.

Unless existing soil conditions are saturated, the General Contractor shall water plants within 24 hrs of backfilling until completely saturated to provide needed moisture and to remove air pockets.

3.2.5.10 Mulch Mat

After backfilling and watering have been completed, mulch mats shall be placed around the base of each installed plant as shown on project Drawings. A gap of 1 to 2 inches shall be present between the mulch mat and the plant trunk or stem. Metal staples (8 inches

minimum) shall be used to secure the mulch mat to the riverbank while maintaining the structural integrity of the soil berm around the plant.

3.2.5.11 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 minimum height of 36 inches. The protector shall be wrapped around the tree and be spaced 6 inches (minimum) 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. A minimum of three metal staples (minimum length of 8 inches) 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.

3.2.5.12 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 INVASIVE PLANT CONTROL

Assessments of invasive plants will be conducted to determine the extent of any invasive plants within the project area. These assessments will be conducted in the spring of the initial planting year and in following years during the specified Plant Establishment Period. If invasive plants are identified within the project area, an invasive plant control plan shall be developed and furnished to the Engineer for approval 2 weeks prior to beginning control treatments. The control plan shall include those items listed in Subsection 1.2 SUBMITTALS. Depending on the time of plant installation, and the invasive species present

and extent, control work could begin prior to plant installation work. Implementation of invasive plant control measures shall be as specified in the specifications or as otherwise deemed necessary to achieve the project goals.

3.4.1 Technical Representative

A technical representative experienced in invasive plant identification and control shall be present at all meetings and control treatment activities to monitor and assess control efforts. This representative must be experienced in the identification of invasive plants typically encountered in New England and in the proper application of appropriate herbicides.

3.4.2 Implementation

Physical, biological, and chemical methods may be employed as part of the invasive plant control plan. If herbicides are used, topical application of herbicide is preferred over foliar application. For the topical application of an herbicide, wicks, brushes, protective cones, or other contact devices shall be utilized to apply herbicide directly to the cut stems and plant material. Where appropriate, foliar application shall utilize low-pressure sprayers with a concentrated distribution pattern or protective cones to apply the herbicides directly to target invasive plant.

A state certified applicator shall apply required herbicides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the herbicide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer that meets local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying herbicide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

Throughout the herbicide application activities, care shall be exercised near planted trees and shrubs, as well as non-invasive volunteer to avoid contact and subsequent plant damage. For example, if invasive plants are tall with a large leaf area then these plants shall be cut to reduce the areal extent spraying so that drift effects are minimized.

All biomass that results from any invasive plant cutting and trimming shall be removed and disposed of appropriately following such activities. If an herbicide is applied, the biomass shall also be appropriately removed based on the effectiveness of the herbicide application.

A 48-hr advance notification to the Engineer shall be provided prior to all invasive plant control work.

3.5 RESTORATION AND CLEAN UP

3.5.1 Restoration

Turf areas, pavements and facilities that have been damaged due to the planting operation shall be restored to original condition.

3.5.2 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 off site. Adjacent paved areas shall be cleared.

3.6 PLANT ESTABLISHMENT PERIOD

3.6.1 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(s) 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.

3.6.2 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; controlling invasive plants; 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 natural regeneration of non-invasive plant growth. 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).

3.6.2.1 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 to 1 inch of absorbed water per week, delivered by natural precipitation and augmented by irrigation, as required. Runoff, erosion, puddling, and wilting shall be prevented. The contractor will maintain a rain gage at the project site and will record precipitation data during the Plant Establishment Period.

3.6.2.2 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.

3.6.2.3 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. Settling that effects 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.

3.6.2.4 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.

3.6.2.5 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 an area 1/16-inch square (maximum) on a branch to determine if there is a green cambium layer below the bark. 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.

3.6.3.6 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.

3.6.3.7 Invasive Plant Control

Treatment for invasive plants shall be in accordance with Subsection 3.4.2 Implementation and the Invasive Species Control Plan.

3.6.3.8 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 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 Excavation Subcontractor 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 the initial section of Phase 3 where the bypass gravity system currently in place will continue to be used to divert the river, Dwight Street shall be used as an access way to the active excavation area. Trucks shall be loaded in the area of Parcel I7-2-44 and run north on Dwight Street across Dawes Avenue to Deming Street, north on Deming Street across Elm Street to the access roads established along the north or west side of the river, and across Lyman Street into the GE-owned Lyman Street Parking Lot to the appropriate staging area or OPCA. In addition, some hauling may be completed from the east side of the river through Parcel I7-3-6 where the disposal route shall be north on Appleton Avenue to Dawes Avenue, west on Dawes Avenue across the Dawes Avenue Bridge to Deming Street, and continue as described above.

For the remaining portion of Phase 3, several truck routes may be established to transport contaminated materials removed from the active excavation area to one of two possible staging areas, the staging area currently in place located on the GE facility or the staging area that may be established at Fred Garner Park. For the section of river between Dawes Avenue and Pomeroy Avenue, it is anticipated that trucks will be loaded on the east and west of the river. For the east side of the river, trucks will enter and exit either Appleton Avenue or lower High Street. For trucks traveling to the staging area on the GE facility, the route will be north on High Street and Appleton Avenue to Dawes Avenue, west on Dawes Avenue to Deming Street, and north on Deming Street. At this point, the trucks will follow the route specified above. Alternate routes are authorized as specified in the EPA Memoranda referenced in Section 02111. For the west side of the river, trucks will exit at Pomeroy Avenue near the Pomeroy Avenue bridge. Trucks will proceed south on Pomeroy Avenue and turn left onto High Street. At this point, trucks will follow the route specified above.

For trucks traveling to and from the east side of the river to Fred Garner Park, the route will be as follows: south on Appleton Avenue and High Street, west on Pomeroy Avenue and into Fred Garner Park. For trucks traveling to and from the west side of the river to Fred Garner Park, trucks will go onto or cross Pomeroy Avenue and into Fred Garner Park.

For material removed from the river downstream of Pomeroy Avenue, trucks shall either transport the material directly to the Fred Garner Park staging area via access roads on the west side of the river or to the staging area located at the GE Facility. For trucks traveling to the GE Facility, the route shall be north on the access road established from Fred Garner Park

to Pomeroy Avenue, south on Pomeroy Avenue to High Street, and follow the same route as described above.

A secondary disposal route from areas of excavation for the remainder of Phase 3 shall include traveling east along Elm Street to Newell Street, north (or east) on Newell Street to Lyman Street, north (or west) on Lyman Street to East Street, east on East Street, and into the GE Facility at the Woodlawn Avenue intersection.

END OF SECTION

DIVISION 11—EQUIPMENT

SECTION 11000

HOUSATONIC RIVER BYPASS GRAVITY FLOW SYSTEM

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

PLASTIC PIPE – Section 15064

1.2 DESCRIPTION OF WORK

a. General Description of Gravity Flow Bypass System

A 3,400-ft length of the Housatonic River, starting at Station 514+00 and extending downstream to approximately Station 548+00 (Phase 2 and the first portion of Phase 3 of the 1.5-Mile Reach Removal Action in Pittsfield, Massachusetts) shall be diverted using a gravity bypass pipe system. This stretch of river shall be progressively diverted by damming the river at Station 514+00, and installing additional lengths of pipe to the end of the existing, two 2,800-ft long (5,600 linear feet), 54-inch outside diameter (O.D.) pipes 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 300 to 500 ft 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. Based on historical hydrologic records covering the period of 10 May through 12 March of the following year, it is estimated 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 gravity piping system. 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 3 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. existing high-density polyethylene (HDPE) mains approximately 2,800 linear feet each in length (downstream of dam location) to be extended an additional 600 ft.

2. An engineered pipe restraint and anchoring system for each pipe.

3. Two 66-inch diameter slide gates with manual 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; G

A Downriver Pipe Arrangement Plan submitted as part of the Excavation Plan, showing the intended 54-inch pipe layout downriver of the dam and 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 (if required) and erosion protection.

The Excavation Plan shall also include the proposed method for preventing cross-contamination of each half of the river, i.e., in Phase 3A (Station 543+50 to Station 547+50) excavation in the riverbed will occur without the benefit of sheet pile diversion cells.

SD-02 Shop Drawings; G

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., DR 26 HDPE gravity pipes of approximately 600 linear feet in length each (total of 1,200 linear feet) which are to be furnished by the General Contractor. Pipe shall be furnished in 50-ft lengths for assembly. 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-ft lengths and shall fusion weld the pipe into approved lengths with flanges at each end. The Excavation Subcontractor shall install the pipe by connecting it to the end of the existing 54-inch HDPE pipe which terminates at approximately Station 542+00.

- 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, at the discharge end of each of the flanged 54-inch O.D. HDPE pipes. The outlet structure shall be installed in such a manner as to allow relocation or re-connection should the gravity lines require extension further downstream. This structure must be designed to prevent erosion 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 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. Output from the existing HEC-RAS model shall be the basis for parameters used under this condition.
- 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 for Phase 2, the Basis of Design Document for Phase 2, the Basis of Design Document for Phase 3, and experience gained through operation of the gravity system.
- 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 conveyance piping at dam and at other points downstream as appropriate.
- j. The pipe supplier shall install gasketed 125/150# American National Institute (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 or one inlet structure covering both gravity intakes. In either case, each inlet structure must allow for raising and lowering of the slide gates individually or must be easily removed for lowering of the slide gates. 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

- a. The Excavation Subcontractor shall utilize two previously installed 66-inch diameter slide gates, one on each of the gravity flow pipes for operation of the gravity bypass system.

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

In addition, installation shall conform with appropriate ASTM standards as referenced by the above PPI standards (see also Specification Section 15064, PLASTIC PIPE, Paragraph 2.2.).

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.
7. Flanged connections must be installed per the manufacturer's instructions. The two pipes being joined via flanges shall be in full contact at the joining edge prior to tightening of the flange bolts. In no instances shall the flanged fittings and bolts be used to pull two pieces of pipe together.

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 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 provide an on-site water treatment plant (WTP) for treatment of all wastewater generated as part of the remediation work to be conducted in Phase 3 from Station 543+50 to Station 575+33. The WTP will be located at Fred Garner Park in Pittsfield, which is adjacent to the Phase 3 work area. Work covered in this specification includes mobilization of the WTP components to the site, installation of the components, start-up and operation of the system, and demobilization at project completion.

The Excavation Subcontractor will be responsible for providing electrical power service as needed to the WTP and will coordinate with Western Massachusetts Electric Co. to obtain the necessary service. 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 Modutanks 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 and other components of the dewatering system as required by Specification Section 02300, EARTHWORK.

1.2 SYSTEM DESCRIPTION

The WTP shall be installed, 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 initial system to be supplied and operated 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, filtration, 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 National Pollutant Discharge Elimination System (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) and as subsequently modified in 2003 and 2004. Increases in the effluent discharge flow rate shall need Government approval. Effluent shall be discharged at an approved location downstream of the active work area. Discharge shall be such that it does not result in scouring of the riverbed or riverbank.

Initially, during construction activities scheduled for Phase 3, the water treatment system will be located on Parcel I8-23-6 and effluent will be discharged upstream of the remediation. However, as construction activities progress downstream past Station 547+50, the water treatment system shall be relocated to Fred Garner Park and the effluent shall be located downstream of all remediated areas.

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 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 Phase 3 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 WTP will be designed to accommodate a design flow of 400 gallons per minute, minimum available head of 0 ft, and intermittent flow conditions.

Summaries of the influent sampling results obtained to date on the project are included in Tables 11800-1 and 11800-2. 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.

1.2.2 Design Criteria

Water treatment system effluent shall meet the discharge limits included in Table 11800-3. These discharge criteria have been approved by the EPA in the NPDES Permit Exclusion as modified and 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 be at Fred Garner Park in Pittsfield.

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, 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 Site Preparation

The Excavation Subcontractor shall be responsible for all site preparation activities related to installing the WTP at Fred Garner Park. This includes preparation of the existing ground, placement of geotextile liner and backfill as needed, and provision of secondary containment as described below.

2.2.2 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.

2.2.3 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.

2.2.4 Utilities

All shall be provided by the Excavation Subcontractor.

2.2.5 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 present for the existing treatment system. The size of secondary containment will depend on the configuration of the treatment system used for Phase 3 and shall be modified accordingly to accommodate all appropriate unit processes. 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 shall perform sampling and analysis in accordance with the attached NPDES Permit Exclusion letters dated September 20, 2002 and April 24, 2003. The compounds listed in Table 11800-3 shall be sampled according to the following schedule:

- Metals shall be sampled and analyzed on a quarterly basis from influent and effluent streams only. Analysis for metals shall not be included on WTP midpoint samples.

- PCBs shall be sampled and analyzed from WTP influent, midpoint, and effluent locations on a monthly basis.
- Sampling and analysis for thallium, VOCs, SVOCs and TPH has been discontinued per the April 24, 2003 NPDES Permit Exclusion letter. The government reserves the right to re-institute sampling for these compounds.

Monthly analytical reports, with quality control information, shall 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

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 EPA, the MDEP Emergency Response Section, and the National Response Center [(800) 424-8802].

Table 11800-1
NPDES PCB Sampling Results for Water Treatment System
GE/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, 1242, & 1248	Aroclor 1254	Aroclor 1260	Total PCBs	
H2-WW000001-0-2S26	Influent	09/26/2002	ND(0.66)	7.3	2.6 J	9.9 J	
H2-WW000001-0-2S28	Influent	09/28/2002	ND(0.013)	0.11	0.088	0.20	
H2-WW000001-0-2S30	Influent	09/30/2002	ND(6.9)	22.0	50.0	72.0	
H2-WW000001-0-2C02	Influent	10/2/2002	ND(0.65)	3.7	5.5	9.2	
H2-WW000001-0-2C11	Influent	10/11/2002	ND(0.025)	0.25 J	0.22 J	0.47 J	
H2-WW000001-1-2C11 (Duplicate)	Influent	10/11/2002	ND(0.038)	0.35 J	0.34 J	0.69 J	
H2-WW000001-0-2C16	Influent	10/16/2002	ND(0.012)	0.38 J	0.82	1.2 J	
H2-WW000001-0-2C23	Influent	10/23/2002	ND(0.042)	0.25	0.30	0.55	
H2-WW000001-0-2N25	Influent	11/25/2002	ND(13)	150	ND(13)	150	
Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, & 1248	Aroclor 1242	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-2D18	Influent	12/18/2002	ND(0.62)	ND(0.62)	9.1	1.2 J	10.0
H2-WW000001-0-3J20	Influent	1/20/2003	ND(2.6)	ND(2.6)	ND(2.6)	27	27
H2-WW000001-0-3F24	Influent	2/24/2003	ND(0.063)	ND(0.063)	0.19	0.54	0.73
H2-WW000001-0-3M27	Influent	3/27/2003	ND(0.052)	ND(0.052)	0.17 J	0.29	0.46 J
H2-WW000001-0-3A24	Influent	4/24/2003	ND(0.012)	ND(0.012)	0.026 J	0.013	0.039 J
H2-WW000001-0-3Y28	Influent	5/28/2003	ND(0.013)	0.092	0.035 J	0.077	0.2 J
H2-WW000001-0-3U12	Influent	6/12/2003	ND(0.012)	ND(0.012)	0.23 J	1.1	1.3 J
H2-WW000001-0-3U25	Influent	6/25/2003	ND(0.67)	ND(0.67)	2.8 J	5.7	8.5 J
H2-WW000001-0-3U25 (duplicate)	Influent	6/25/2003	ND(1.4)	ND(1.4)	7.6 J	18.0	26 J
H2-WW000001-0-3L16	Influent	7/16/2003	ND(0.026)	0.14	0.1 J	0.22	0.46 J
H2-WW000001-0-3S09	Influent	9/9/2003	ND(0.014)	ND(0.014)	0.34 J	1.5	1.8 J
H2-WW000001-0-3C08	Influent	10/8/2003	ND(0.012)	ND(0.012)	0.2 J	1.2	1.4 J
H2-WW000001-1-3C08 (duplicate)	Influent	10/8/2003	ND(0.037)	ND(0.037)	0.092 J	0.39	0.48 J

Table 11800-1
NPDES PCB Sampling Results for Water Treatment System
GE/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Notes:

ND(0.013) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

J - Indicates an estimated value

9/26/02 - Day 1 sampling

9/28/02 - Day 3 sampling

9/30/02 - Day 5 sampling

10/2/02 - Day 7 sampling

10/11/02 - weekly sampling

10/16/02 - weekly sampling

10/23/02 - weekly sampling

11/25/02 - monthly sampling

12/18/02 - monthly sampling

1/20/03 - monthly sampling

2/24/03 - monthly sampling

3/27/03 - monthly sampling

4/24/03 - monthly sampling

5/28/03 - monthly sampling

6/12/03 - additional sampling completed during Cell 11A excavation due to presence of NAPL in the Cell.

6/25/03 - monthly sampling

7/16/03 - monthly sampling

9/09/03 - monthly sampling

10/08/03 - monthly sampling

4/21/04 - monthly sampling

Table 11800-1
NPDES PCB Sampling Results for Water Treatment System
September 2002 Monthly Report

GE/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, 1242, & 1248	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-2S26	Influent	09/26/2002	ND(0.66)	7.3	2.6 J	9.9 J
H2-WW000002-0-2S26	Intermediate	09/26/2002	ND(0.013)	0.026	0.024	0.050
H2-WW000003-0-2S26	Effluent	09/26/2002	ND(0.013)	0.019	0.016	0.035
H2-WW000001-0-2S28	Influent	09/28/2002	ND(0.013)	0.11	0.088	0.20
H2-WW000002-0-2S28	Intermediate	09/28/2002	ND(0.013)	0.015	0.019	0.034
H2-WW000003-0-2S28	Effluent	09/28/2002	ND(0.013)	ND(0.013)	0.014	0.014
H2-WW000001-0-2S30	Influent	09/30/2002	ND(6.9)	22.0	50.0	72.0
H2-WW000002-0-2S30	Intermediate	09/30/2002	ND(0.014)	0.032	0.041	0.073
H2-WW000003-0-2S30	Effluent	09/30/2002	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)
Action Level	Effluent		0.50	0.50	0.50	0.50

Notes:

ND(0.013) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

9/26/02 - Day 1 sampling

9/28/02 - Day 3 sampling

9/30/02 - Day 5 sampling

Table 11800-1
NPDES PCB Sampling Results for Water Treatment System
October 2002 Monthly Report

GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, 1242, & 1248	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-2C02	Influent	10/2/2002	ND(0.65)	3.7	5.5	9.2
H2-WW000002-0-2C02	Intermediate	10/2/2002	ND(0.013)	0.095	0.18	0.28
H2-WW000003-0-2C02	Effluent	10/2/2002	ND(0.012)	0.032	0.078	0.11
H2-WW000001-0-2C11	Influent	10/11/2002	ND(0.025)	0.25 J	0.22 J	0.47 J
H2-WW000001-1-2C11 (Duplicate)	Influent	10/11/2002	ND(0.038)	0.35 J	0.34 J	0.69 J
H2-WW000002-0-2C11	Intermediate	10/11/2002	ND(0.013)	ND(0.013)	0.014	0.014
H2-WW000003-0-2C11	Effluent	10/11/2002	ND(0.013)	ND(0.013)	0.016	0.016
H2-WW000001-0-2C16	Influent	10/16/2002	ND(0.012)	0.38 J	0.82	1.2 J
H2-WW000002-0-2C16	Intermediate	10/16/2002	ND(0.025)	0.18	0.25	0.43
H2-WW000003-0-2C16	Effluent	10/16/2002	ND(0.012)	0.074 J	0.14 J	0.21 J
H2-WW000001-0-2C23	Influent	10/23/2002	ND(0.042)	0.25	0.30	0.55
H2-WW000002-0-2C23	Intermediate	10/23/2002	ND(0.013)	0.017 J	0.021	0.038 J
H2-WW000003-0-2C23	Effluent	10/23/2002	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)
Action Level	Effluent		0.50	0.50	0.50	0.50

Notes:

ND(0.013) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

10/2/02 - Day 7 sampling

10/11/02 - weekly sampling

10/16/02 - weekly sampling

10/23/02 - weekly sampling

Table 11800-1
NPDES Sampling Results for Water Treatment System
November 2002 Monthly Report

GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, 1242, & 1248	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-2N25	Influent	11/25/2002	ND(13)	150	ND(13)	150
H2-WW000002-0-2N25	Intermediate	11/25/2002	ND(0.13)	0.97	ND(0.13)	0.97
H2-WW000003-0-2N25	Effluent	11/25/2002	ND(0.025)	0.29	ND(0.025)	0.29
Action Level	Effluent		0.50	0.50	0.50	0.50

Notes:

ND(0.13) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

11/25/02 - monthly sampling

Table 11800-1
NPDES Sampling Results for Water Treatment System
December 2002 Monthly Report

GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, & 1248	Aroclor 1242	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-2D18	Influent	12/18/2002	ND(0.62)	ND(0.62)	9.1	1.2 J	10.0
H2-WW000002-0-2D18	Intermediate	12/18/2002	ND(0.38)	ND(0.38)	4.1	0.65 J	4.8 J
H2-WW000003-0-2D18	Effluent	12/18/2002	ND(0.025)	0.075	0.21	ND(0.025)	0.28
Action Level	Effluent		0.50	0.50	0.50	0.50	0.50

Notes:

ND(0.62) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

J - Indicates an estimated value

12/18/02 - monthly sampling

Table 11800-1
NPDES Sampling Results for Water Treatment System
January 2003 Monthly Report

GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, & 1248	Aroclor 1242	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-3J20	Influent	1/20/2003	ND(2.6)	ND(2.6)	ND(2.6)	27	27
H2-WW000002-0-3J20	Intermediate	1/20/2003	ND(0.013)	ND(0.013)	0.11	0.042 J	0.15 J
H2-WW000003-0-3J20	Effluent	1/20/2003	ND(0.012)	ND(0.012)	0.076	0.040	0.12
Action Level	Effluent		0.50	0.50	0.50	0.50	0.50

Notes:

ND(0.012) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

J - Indicates an estimated value

1/20/03 - monthly sampling

Table 11800-1
NPDES Sampling Results for Water Treatment System
February 2003 Monthly Report

GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, & 1248	Aroclor 1242	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-3F24	Influent	2/24/2003	ND(0.063)	ND(0.063)	0.19	0.54	0.73
H2-WW000002-0-3F24	Intermediate	2/24/2003	ND(0.012)	ND(0.012)	0.030	ND(0.012)	0.030
H2-WW000003-0-3F24	Effluent	2/24/2003	ND(0.012)	ND(0.012)	0.020	ND(0.012)	0.020
Action Level	Effluent		0.50	0.50	0.50	0.50	0.50

Notes:

ND(0.012) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

J - Indicates an estimated value

2/24/03 - monthly sampling

Table 11800-1
NPDES Sampling Results for Water Treatment System
March 2003 Monthly Report

GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, & 1248	Aroclor 1242	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-3M27	Influent	3/27/2003	ND(0.052)	ND(0.052)	0.17 J	0.29	0.46 J
H2-WW000002-0-3M27	Intermediate	3/27/2003	ND(0.013)	ND(0.013)	0.074 J	0.054	0.13 J
H2-WW000003-0-3M27	Effluent	3/27/2003	ND(0.013)	ND(0.013)	0.11 J	0.07	0.18 J
Action Level	Effluent		0.50	0.50	0.50	0.50	0.50

Notes:

ND(0.012) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

J - Indicates an estimated value

3/27/03 - monthly sampling

Table 11800-1
NPDES Sampling Results for Water Treatment System
April 2003 Monthly Report

GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, & 1248	Aroclor 1242	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-3A24	Influent	4/24/2003	ND(0.012)	ND(0.012)	0.026 J	0.013	0.039 J
H2-WW000002-0-3A24	Intermediate	4/24/2003	ND(0.012)	ND(0.012)	0.02 J	ND(0.012)	0.02 J
H2-WW000003-0-3A24	Effluent	4/24/2003	ND(0.012)	ND(0.012)	0.04 J	ND(0.012)	0.04 J
Action Level	Effluent		0.50	0.50	0.50	0.50	0.50

Notes:

ND(0.012) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

J - Indicates an estimated value

4/24/03 - monthly sampling

Table 11800-1
PDES Sampling Results for Water Treatment System
May 2003 Monthly Report

GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, & 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-3Y28	Influent	5/28/2003	ND(0.013)	0.092	0.035 J	0.077	0.2 J
H2-WW000002-0-3Y28	Intermediate	5/28/2003	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)
H2-WW000003-0-3Y28	Effluent	5/28/2003	ND(0.013)	ND(0.013)	0.014 J	ND(0.013)	0.014 J
Action Level	Effluent		0.50	0.50	0.50	0.50	0.50

Notes:

ND(0.012) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

5/28/03 - monthly sampling

Table 11800-1
NPDES Sampling Results for Water Treatment System
June 2003 Monthly Report

GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, & 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-3U12	Influent	6/12/2003	ND(0.012)	ND(0.012)	0.23 J	1.1	1.3 J
H2-WW000002-0-3U12	Intermediate	6/12/2003	ND(0.012)	ND(0.012)	0.021 J	0.016	0.037 J
H2-WW000003-0-3U12	Effluent	6/12/2003	ND(0.013)	ND(0.013)	0.018 J	ND(0.013)	0.018 J
H2-WW000001-0-3U25	Influent	6/25/2003	ND(0.67)	ND(0.67)	2.8 J	5.7	8.5 J
H2-WW000001-0-3U25 (duplicate)	Influent	6/25/2003	ND(1.4)	ND(1.4)	7.6 J	18.0	26 J
H2-WW000002-0-3U25	Intermediate	6/25/2003	ND(0.063)	ND(0.063)	0.56 J	0.10	0.66 J
H2-WW000003-0-3U25	Effluent	6/25/2003	ND(0.012)	ND(0.012)	0.027 J	0.019 J	0.046 J
Action Level	Effluent		0.50	0.50	0.50	0.50	0.50

Notes:

ND(0.012) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

6/12/03 - additional sampling completed during Cell 11A excavation due to presence of NAPL in the Cell.

6/25/03 - monthly sampling

Table 11800-1
NPDES Sampling Results for Water Treatment System
July 2003 Monthly Report

GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, & 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-3L16	Influent	7/16/2003	ND(0.026)	0.14 J	0.1 J	0.22 J	0.46 J
H2-WW000001-0-3L16	Intermediate	7/16/2003	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)
H2-WW000001-0-3L16	Effluent	7/16/2003	ND(0.013)	ND(0.013)	0.014 J	ND(0.013)	0.014 J
Action Level	Effluent		0.50	0.50	0.50	0.50	0.50

Notes:

ND(0.013) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

7/16/03 - monthly sampling

Table 11800-1
NPDES Sampling Results for Water Treatment System
September 2003 Monthly Report

GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, & 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-3S09	Influent	9/9/2003	ND(0.014)	ND(0.014)	0.34 J	1.5	1.8 J
H2-WW000002-0-3S09	Intermediate	9/9/2003	ND(0.012)	ND(0.012)	0.048 J	0.034	0.082 J
H2-WW000003-0-3S09	Effluent	9/9/2003	ND(0.013)	ND(0.013)	0.047 J	0.030	0.077 J
Action Level	Effluent		0.50	0.50	0.50	0.50	0.50

Notes:

ND(0.013) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

9/09/03 - monthly sampling

Table 11800-1
NPDES Sampling Results for Water Treatment System
October 2003 Monthly Report

GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA

(Results are presented in part per billion, ppb)

Sample ID	Location	Date Collected	Aroclor 1016, 1221, 1232, & 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
H2-WW000001-0-3C08	Influent	10/8/2003	ND(0.012)	ND(0.012)	0.2 J	1.2	1.4 J
H2-WW000001-1-3C08 (duplicate)	Influent	10/8/2003	ND(0.037)	ND(0.037)	0.092 J	0.39	0.48 J
H2-WW000002-0-3C08	Intermediate	10/8/2003	ND(0.012)	ND(0.012)	0.018 J	ND(0.012)	0.018 J
H2-WW000003-0-3C08	Effluent	10/8/2003	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)
Action Level	Effluent		0.50	0.50	0.50	0.50	0.50

Notes:

ND(0.013) - Analyte was not detected. The value in parentheses is the associated detection limit.

Intermediate - sample collected between carbon units which are being operated in series.

10/08/03 - monthly sampling

**Table 11800-2 - NPDES Non-PCB Sampling Results for Water Treatment System
October 2002**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-2S26	H2-WW000001-0-2S28	H2-WW000001-0-2S30	H2-WW000001-0-2C02	NPDES Permit Regulatory Effluent Limits
Sample type	Influent	Influent	Influent	Influent	
Date Collected	09/26/2002	09/28/2002	09/30/2002	10/02/2002	
Analyte					
APP IX SEMIVOLATILES					
1,2,4,5-TETRACHLOROBENZENE	ND	ND	0.98 J	ND	100
1,2,4-TRICHLOROBENZENE	1.1 J	ND	2.3 J	0.90 J	70
1,2-DICHLOROBENZENE	ND	ND	1.1 J	ND	75
1,3-DICHLOROBENZENE	0.87 J	ND	1.0 J	ND	100
1,4-DICHLOROBENZENE	3.3 J	0.54 J	13.0	2.6 J	100
2-METHYLNAPHTHALENE	2.6 J	ND	13.0	5.1 J	100
ACENAPHTHENE	5.5 J	ND	31.0 J	13.0 J	100
ACENAPHTHYLENE	ND	ND	2.4 J	0.48 J	100
ANTHRACENE	1.1 J	ND	15.0	2.6 J	100
BENZO(A)ANTHRACENE	1.1 J	ND	13.0 J	0.71 J	100
BENZO(A)PYRENE	0.85 J	ND	12.0 J	0.47 J	100
BENZO(B)FLUORANTHENE	0.64 J	ND	5.7 J	ND	100
BENZO(GHI)PERYLENE	0.82 J	ND	5.4 J	ND	100
BENZO(K)FLUORANTHENE	0.99 J	ND	7.1 J	ND	100
BIS(2-ETHYLHEXYL) PHTHALATE	1.5 J	ND	3.8 J	ND	100
CHRYSENE	1.4 J	ND	13.0	0.63 J	100
DIALLATE	ND	ND	1.1 J	ND	N/A
DIBENZOFURAN	ND	ND	1.4 J	0.57 J	N/A
DI-N-BUTYL PHTHALATE	ND	ND	0.48 J	ND	N/A
FLUORANTHENE	2.1 J	ND	22.0	2.7 J	100
FLUORENE	2.4 J	ND	17.0	6.6 J	100
INDENO(1,2,3-C,D)PYRENE	0.55 J	ND	3.9 J	ND	100
NAPHTHALENE	5.6 J	ND	15.0	4.9 J	100
PENTACHLOROBENZENE	ND	ND	5.2 J	ND	100
PHENANTHRENE	6.0 J	ND	60.0	16.0	100
PYRENE	3.5 J	ND	38.0 J	4.6 J	100
APP IX VOLATILES			APP IX VOLATILES		
1,2,4-TRICHLOROBENZENE	1.3	ND	1.3	1.2	70
1,2-DICHLOROBENZENE	0.43 J	ND	0.74 J	0.40 J	75
1,2-XYLENE	0.20 J	ND	ND	0.48 J	*
1,3-DICHLOROBENZENE	0.84 J	0.27 J	0.63 J	0.46 J	100
1,4-DICHLOROBENZENE	4.2	1.5	7.7	4.1	100
ACETONE	3.1 J	2.4 J	ND	4.4 J	100
BENZENE	0.54 J	0.45 J	0.90 J	0.61 J	5*
CARBON TETRACHLORIDE	ND	ND	0.26 J	0.40 J	N/A
CHLOROBENZENE	4.2	2.6	6.1	4.0	100
CHLOROETHANE	ND	ND	ND	0.37 J	N/A
CHLOROFORM	0.42 J	0.32 J	0.33 J	0.32 J	100
CHLOROMETHANE	ND	ND	0.39 J	0.33 J	N/A
CIS-1,2-DICHLOROETHENE	13.0	2.7	4.2	4.2	N/A
ETHYL BENZENE	0.36 J	ND	ND	0.61 J	*
M,P-XYLENE (SUM OF ISOMERS)	ND	ND	ND	1.3	*
NAPHTHALENE	4.7	ND	9.9 J	11.0	100
TOLUENE	0.21 J	ND	ND	0.25 J	*
TRICHLOROETHYLENE (TCE)	3.6	1.5	2.2	2.9	N/A
VINYL CHLORIDE	5.2	0.89 J	1.5	1.6	
XYLENES (TOTAL)	0.20 J	ND	ND	1.8	*

**Table 11800-2 - NPDES Non-PCB Sampling Results for Water Treatment System
October 2002**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-2S26	H2-WW000001-0-2S28	H2-WW000001-0-2S30	H2-WW000001-0-2C02	NPDES Permit Regulatory Effluent Limits
Sample type	Influent	Influent	Influent	Influent	
Date Collected	09/26/2002	09/28/2002	09/30/2002	10/02/2002	
Analyte					
METALS			METALS		
ARSENIC	5.8 J	ND	7.1 J	ND	50
BARIUM	156 J	27.4 J	132 J	71.2 J	100
BERYLLIUM	0.50 J	ND	0.58 J	0.38 J	4
CADMIUM	ND	ND	0.41 J	0.35 J	N/A
CHROMIUM	12.6	ND	28.1	ND	100
COBALT	8.5 J	ND	14.4 J	8.0 J	100
COPPER	49.4	ND	130	41.6	100
LEAD	71.4	ND	179	51.9	50
MERCURY	0.23	ND	ND	ND	N/A
NICKEL	15.4 J	ND	30.8 J	ND	100
THALLIUM	0.16 J	ND	0.32 J	ND	2
TIN	5.2 J	ND	17.3 J	ND	100
VANADIUM	14.4 J	ND	21.1 J	4.1 J	100
ZINC	117 J	10.7 J	277	66.9	100
ORGANIC			ORGANIC		
PETROLEUM HYDROCARBON	2200	1800	1400	3000	5000

NOTES:

- * Total BTEX (Benzene, Toluene, Ethyl Benzene and Xylene) can not exceed 100 ppb
- Intermediate - sample collected between carbon units which are being operated in series.
- N/A - not applicable
- Only detected constituents are summarized
- ND - not detected
- J - Indicates an estimated value
- 9/26/02 - Day 1 sampling
- 9/28/02 - Day 3 sampling
- 9/30/02 - Day 5 sampling
- 10/2/02 - Day 7 sampling

**Table 11800-2 - NPDES Non-PCB Sampling Results for Water Treatment System
November 2002**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-2C11	H2-WW000001-1-2C11	H2-WW000001-0-2C16	H2-WW000001-0-2C23	NPDES Permit Regulatory Effluent Limits
Sample type	Influent	Influent (duplicate)	Influent	Influent	
Date Collected	10/11/2002	10/11/2002	10/16/2002	10/23/2002	
Analyte					
APP IX SEMIVOLATILES					
1,2,4-TRICHLOROBENZENE	ND	0.49 J	ND	ND	70
1,4-DICHLOROBENZENE	ND	0.48 J	ND	ND	100
ACENAPHTHENE	ND	ND	1.2 J	1.4 J	100
BIS(2-ETHYLHEXYL) PHTHALATE	ND	ND	1.7 J	0.95 J	100
DI-N-BUTYL PHTHALATE	ND	ND	ND	0.58 J	N/A
FLUORENE	ND	ND	0.60 J	ND	100
PYRENE	ND	ND	0.46 J	ND	100
APP IX VOLATILES					
1,2,4-TRICHLOROBENZENE	0.50 J	0.50 J	ND	ND	70
1,2-DICHLOROBENZENE	0.22 J	0.22 J	ND	ND	75
1,3-DICHLOROBENZENE	0.22 J	0.22 J	ND	ND	100
1,4-DICHLOROBENZENE	0.79 J	0.79 J	ND	ND	100
ACETONE	2.1 J	ND	3.5 J	ND	100
BENZENE	0.48 J	0.50 J	ND	ND	5*
CARBON TETRACHLORIDE	7.9	7.6	3.3 J	7.2 J	N/A
CHLOROENZENE	2.7	2.5	4.2	0.56 J	100
CHLOROFORM	0.99 J	1.0	0.95 J	ND	100
CIS-1,2-DICHLOROETHENE	4.6	4.5	2.1 J	0.54 J	N/A
DIBROMOMETHANE	ND	ND	ND	ND	N/A
NAPHTHALENE	0.48 J	0.46 J	ND	ND	100
TERT-BUTYL METHYL ETHER	0.52 J	0.58 J	3.5	25.0	70
TETRACHLOROETHYLENE(PCE)	ND	ND	ND	0.31 J	N/A
TOLUENE	ND	ND	ND	ND	*
TRICHLOROETHYLENE (TCE)	12.0	12.0	5.0 J	7.2 J	N/A
VINYL CHLORIDE	1.8	1.8 J	ND	ND	N/A
METALS					
BARIUM	31.7	31.7 J	31.3 J	16.8 J	100
COPPER	2.9	2.7 J	6.0 J	ND	100
LEAD	2.3	1.8 J	7.8	1.2 J	50
ZINC	21.6	19.9 J	13.4 J	ND	100
ORGANIC					
PETROLEUM HYDROCARBON	ND	ND	ND	ND	5000

NOTES:

- * Total BTEX (Benzene, Toluene, Ethyl Benzene and Xylene) can not exceed 100 ppb
- Intermediate - sample collected between carbon units which are being operated in series.
- Only detected constituents are summarized
- ND - not detected
- not sampled
- J - Indicates an estimated value
- N/A - not available

**Table 11800-2 - NPDES Non-PCB Sampling Results for Water Treatment System
December 2002**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-2N25	NPDES Permit Regulatory Effluent Limits
Sample type	Influent	
Date Collected	11/25/2002	
Analyte		
APP IX SEMIVOLATILES		
1,2,4,5-TETRACHLOROBENZENE	0.54 J	100
1,2,4-TRICHLOROBENZENE	36.0	70
1,2-DICHLOROBENZENE	0.86 J	75
2-METHYLNAPHTHALENE	0.54 J	100
ACENAPHTHENE	1.1 J	100
BIS(2-ETHYLHEXYL) PHTHALATE	0.75 J	100
NAPHTHALENE	2.2 J	100
PHENANTHRENE	0.51 J	100
APP IX VOLATILES		
1,2,4-TRICHLOROBENZENE	40.0	70
1,2-DICHLOROBENZENE	1.2	75
1,2-XYLENE	2.0	*
1,4-DICHLOROBENZENE	1.9	100
BENZENE	0.20 J	5*
CARBON TETRACHLORIDE	75.0	N/A
CHLOROBENZENE	0.52 J	100
CHLOROFORM	9.5 J	100
CIS-1,2-DICHLOROETHENE	2.4	N/A
M,P-XYLENE (SUM OF ISOMERS)	1.4	*
METHYLENE CHLORIDE	0.53 J	N/A
NAPHTHALENE	2.8	100
TERT-BUTYL METHYL ETHER	42.0	70
TETRACHLOROETHYLENE(PCE)	4.6	N/A
TRICHLOROETHYLENE (TCE)	66.0 J	N/A
XYLENES (TOTAL)	3.5	*
METALS		
BARIUM	16.1 J	100
COPPER	4.7 J	100
LEAD	ND	50
ZINC	8.7 J	100
ORGANIC		
PETROLEUM HYDROCARBON	ND	5000

NOTES:

- * Total BTEX (Benzene, Toluene, Ethyl Benzene and Xylene) can not exceed 100 ppb
- Intermediate - sample collected between carbon units which are being operated in series.
- Only detected constituents are summarized
- ND - not detected
- not sampled
- J - Indicates an estimated value

**Table 11800-2 - NPDES Non-PCB Sampling Results for Water Treatment System
January 2003**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-2D18	NPDES Permit Regulatory
Sample type	Influent	
Date Collected	12/18/2002	
Analyte		
APP IX SEMIVOLATILES		
1,2,4-TRICHLOROBENZENE	3.0 J	70
BIS(2-ETHYLHEXYL) PHTHALATE	ND	100
BUTYLBENZYLPHTHALATE	1.8 J	N/A
APP IX VOLATILES		
1,2,4-TRICHLOROBENZENE	2.1	70
ACETONE	3.5 J	100
ACRYLONITRILE	5.4 J	N/A
BENZENE	0.36 J	5*
CARBON TETRACHLORIDE	1.9 J	N/A
CHLOROBENZENE	0.91 J	100
CHLOROFORM	0.57 J	100
CIS-1,2-DICHLOROETHENE	0.74 J	N/A
M,P-XYLENE (SUM OF ISOMERS)		*
METHYLENE CHLORIDE	ND	N/A
NAPHTHALENE	ND	100
TERT-BUTYL METHYL ETHER	49.0 J	70
TRICHLOROETHYLENE (TCE)	2.4	N/A
METALS		
BARIUM	20.3 J	100
COPPER	ND	100
LEAD	4.5	50
NICKEL	1.7 J	100
ZINC	66.2	500
ORGANIC		
PETROLEUM HYDROCARBON	ND	5000

NOTES:

* Total BTEX (Benzene, Toluene, Ethyl Benzene and Xylene) can not exceed 100 ppb
Intermediate - sample collected between carbon units which are being operated in series.

Only detected constituents are summarized

ND - not detected

--- not sampled

J - Indicates an estimated value

570 Exeedence of permit limit

**Table 11800-2- NPDES Non-PCB Sampling Results for Water Treatment System
February 2003**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-3J20	NPDES Permit
Sample type	Influent	Regulatory
Date Collected	1/20/2003	Effluent Limits
Analyte		
APP IX SEMIVOLATILES		
1,2,4-TRICHLOROBENZENE	0.69 J	70
1,4-DICHLOROBENZENE	2.3 J	100
ACENAPHTHENE	0.54 J	N/A
BENZO(A)ANTHRACENE	0.85 J	N/A
BIS(2-ETHYLHEXYL) PHTHALATE	0.71 J	100
CHRYSENE	1.1 J	N/A
FLUORANTHENE	2.0 J	N/A
PHENANTHRENE	1.1 J	N/A
PYRENE	2.1 J	N/A
APP IX VOLATILES		
1,2,4-TRICHLOROBENZENE	ND	70
1,4-DICHLOROBENZENE	2.5 J	75
CHLOROBENZENE	2.7 J	100
CIS-1,2-DICHLOROETHENE	1.7 J	N/A
TERT-BUTYL METHYL ETHER	2.9 J	70
METALS		
BARIUM	49.1J	100
COPPER	35.9	100
CHROMIUM	16.0	100
COBALT	5.1 J	100
LEAD	42.9	50
NICKEL	9.8 J	100
SELENIUM	2.9 J	N/A
TIN	5.5 J	100
VANADIUM	7.4 J	100
ZINC	66.1	500
ORGANIC		
PETROLEUM HYDROCARBON	1300	5000

NOTES:

- * Total BTEX (Benzene, Toluene, Ethyl Benzene and Xylene) can not exceed 100 ppb
- Intermediate - sample collected between carbon units which are being operated in series.
- Only detected constituents are summarized
- ND - not detected
- not sampled
- J - Indicates an estimated value
- N/A - not applicable

**Table 11800-2 - NPDES Non-PCB Sampling Results for Water Treatment System
March 2003**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-3F24	NPDES Permit
Sample type	Influent	Regulatory
Date Collected	2/24/2003	Effluent Limits
Analyte		
APP IX SEMIVOLATILES		
BIS(2-ETHYLHEXYL) PHTHALATE	6.7 J	100
APP IX VOLATILES		
1,2,4-TRICHLOROBENZENE	ND	70
BENZENE	0.54 J	5*
CARBON TETRACHLORIDE	ND	N/A
CHLOROBENZENE	2.6	100
CHLOROFORM	0.26 J	100
CIS-1,2-DICHLOROETHENE	1.3	N/A
NAPHTHALENE	ND	100
TERT-BUTYL METHYL ETHER	0.52 J	70
TRICHLOROETHYLENE (TCE)	1.6	N/A
VINYL CHLORIDE	0.28 J	N/A
METALS		
ANTIMONY	3.0	N/A
BARIUM	24.4	100
BERYLLIUM	ND	4
COPPER	9.0	100
LEAD	10.0	50
NICKEL	ND	100
ZINC	26.2	500
ORGANIC		
PETROLEUM HYDROCARBON	ND	5000

NOTES:

- * Total BTEX (Benzene, Toluene, Ethyl Benzene and Xylene) can not exceed 100 ppb
- Intermediate - sample collected between carbon units which are being operated in series.
- Only detected constituents are summarized
- ND - not detected
- not sampled
- J - Indicates an estimated value
- N/A - not applicable

**Table 11800-2 - NPDES Non-PCB Sampling Results for Water Treatment System
April 2003**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-3M27	NPDES Permit Regulatory Effluent Limits
Sample type	Influent	
Date Collected	3/27/2003	
Analyte		
APP IX SEMIVOLATILES		
	All Non-Detects	
APP IX VOLATILES		
CHLOROFORM	ND	100
TERT-BUTYL METHYL ETHER	0.51 J	70
METALS		
BARIUM	17.8	100
COPPER	3.2	100
LEAD	3.7	50
ZINC	7.9	500
ORGANIC		
PETROLEUM HYDROCARBON	ND	5000

NOTES:

Intermediate - sample collected between carbon units which are being operated in series.

Only detected constituents are summarized

ND - not detected

--- not sampled

J - Indicates an estimated value

**Table 11800-2 - NPDES Non-PCB Sampling Results for Water Treatment System
June 2003**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-3Y28	H2-WW000001-0-3U12	NPDES Permit Regulatory Effluent Limits
Sample type	Influent	Influent	
Date Collected	05/28/2003	06/12/2003	
Analyte			
APP IX SEMIVOLATILES			
2-METHYLNAPHTHALENE	ND	120	100
ACENAPHTHENE	0.55 J	86.0	100
ACENAPHTHYLENE	ND	3.5 J	100
ANTHRACENE	ND	29.0	100
BENZO(A)ANTHRACENE	ND	13.0 J	100
BENZO(A)PYRENE	ND	13.0 J	100
BENZO(B)FLUORANTHENE	ND	5.6 J	100
BENZO(GH)PERYLENE	ND	4.2 J	100
BENZO(K)FLUORANTHENE	ND	7.4 J	100
BIS(2-ETHYLHEXYL) PHTHALATE	ND	ND	100
BUTYLBENZYLPHthalate	ND	1.7 J	100
CHRYSENE	ND	11.0 J	100
DIBENZOFURAN	ND	3.3 J	100
DIETHYL PHTHALATE	ND	1.1 J	100
FLUORANTHENE	ND	30.0	100
FLUORENE	ND	40.0	100
INDENO(1,2,3-C,D)PYRENE	ND	3.2 J	100
NAPHTHALENE	ND	150	100
PHENANTHRENE	ND	100	100
PYRENE	ND	54.0	100
APP IX VOLATILES			
1,2,4-TRICHLOROBENZENE	ND	2.4 J	70
BENZENE	23.0	56.0	5*
CARBON DISULFIDE	ND	2.6 J	N/A
CARBON TETRACHLORIDE	ND	ND	N/A
CHLOROFORM	ND	ND	100
CIS-1,2-DICHLOROETHENE	0.37 J	ND	N/A
ETHYL BENZENE	6.8	19.0	N/A
M,P-XYLENE (SUM OF ISOMERS)	9.6	23.0	*
METHYLENE CHLORIDE	1.0 J	ND	N/A
NAPHTHALENE	20.0	320	100
O-XYLENE	2.7	4.9 J	*
TERT-BUTYL METHYL ETHER	63.0	83.0	70
TETRACHLOROETHYLENE(PCE)	11.0 J	15.0	N/A
TOLUENE	3.9	12.0	*
XYLENES (TOTAL)	13.0	29.0	*
ORGANIC			
PETROLEUM HYDROCARBON	ND	ND	5000

NOTES:

* Total BTEX (Benzene, Toluene, Ethyl Benzene and Xylene) can not exceed 100 ppb
Intermediate - sample collected between carbon units which are being operated in series.
Only detected constituents are summarized
ND - not detected
--- not sampled
J - Indicates an estimated value
N/A - not available

**Table 11800-2- NPDES Non-PCB Sampling Results for Water Treatment System
July 2003**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-3U25	H2-WW000001-1-3U25	NPDES Permit Regulatory Effluent Limits
Sample type	Influent	Influent (duplicate)	
Date Collected	06/25/2003	06/25/2003	
Analyte			
APP IX SEMIVOLATILES			
2-METHYLNAPHTHALENE	35.0	22.0	100
ACENAPHTHENE	31.0	20.0	100
ANTHRACENE	7.2 J	4.5 J	100
BENZO(A)ANTHRACENE	2.0 J	1.5 J	100
BENZO(A)PYRENE	1.5 J	1.1 J	100
BENZO(B)FLUORANTHENE	0.82 J	0.58 J	100
BENZO(K)FLUORANTHENE	1.0 J	0.76 J	100
BIS(2-ETHYLHEXYL) PHTHALATE	ND	ND	100
CHRYSENE	2.0 J	1.5 J	100
DIBENZOFURAN	2.1 J	1.3 J	100
FLUORANTHENE	4.8 J	3.6 J	100
FLUORENE	11.0	7.6 J	100
NAPHTHALENE	49.0	29.0	100
PHENANTHRENE	28.0	18.0	100
PYRENE	8.5 J	5.1 J	100
APP IX VOLATILES			
1,2,4-TRICHLORO BENZENE	0.29 J	0.30 J	70
1,4-DICHLORO BENZENE	0.58 J	0.60 J	100
ACETONE	5.2 J	5.0 J	100
BENZENE	6.1	6.6	5*
CARBON TETRACHLORIDE	ND	ND	N/A
CHLORO BENZENE	2.2	2.4	100
CHLOROETHANE	0.38 J	0.42 J	N/A
CHLOROFORM	ND	ND	100
CHLOROMETHANE	ND	ND	N/A
CIS-1,2-DICHLOROETHENE	2.3	2.2	N/A
ETHYL BENZENE	2.8	2.8	N/A
ISOBUTANOL	54.0 J	ND	N/A
M,P-XYLENE (SUM OF ISOMERS)	2.9	2.7	*
METHYL METHACRYLATE	1.1	0.98 J	N/A
NAPHTHALENE	43.0	58.0	100
O-XYLENE	0.62 J	0.59 J	*
TERT-BUTYL METHYL ETHER	ND	ND	70
TOLUENE	0.57 J	0.57 J	*
TRICHLOROETHYLENE (TCE)	0.95 J	0.95 J	5
XYLENES (TOTAL)	3.6	3.4	*
ORGANIC			
PETROLEUM HYDROCARBON	4000	3100	5000

NOTES:

* Total BTEX (Benzene, Toluene, Ethyl Benzene and Xylene) can not exceed 100 ppb
Intermediate - sample collected between carbon units which are being operated in series.

Only detected constituents are summarized

ND - not detected

--- not sampled

J - Indicates an estimated value

N/A - not available

**Table 11800-2- NPDES Non-PCB Sampling Results for Water Treatment System
August 2003**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-3L16	NPDES Permit Regulatory Effluent Limits
Sample type	Influent	
Date Collected	7/16/2003	
Analyte		
APP IX SEMIVOLATILES		
2-METHYLNAPHTHALENE	2.5 J	100
ACENAPHTHENE	9.1 J	100
ACENAPHTHYLENE	0.62 J	100
ANTHRACENE	2.8 J	100
BENZO(A)ANTHRACENE	1.0 J	100
BENZO(A)PYRENE	0.83 J	100
BUTYLBENZYLPHthalate	0.54 J	100
CHRYSENE	0.99 J	100
FLUORANTHENE	3.6 J	100
FLUORENE	4.6 J	100
NAPHTHALENE	1.3 J	100
PHENANTHRENE	10.0 J	100
PYRENE	4.7 J	100
APP IX VOLATILES		
BENZENE	7.2	5*
CARBON TETRACHLORIDE	ND	N/A
CHLOROFORM	ND	100
CIS-1,2-DICHLOROETHENE	1.9	N/A
ETHYL BENZENE	0.95 J	N/A
M,P-XYLENE (SUM OF ISOMERS)	0.90 J	*
NAPHTHALENE	11.0 J	100
O-XYLENE	0.20 J	*
TERT-BUTYL METHYL ETHER	15.0	70
TETRACHLOROETHYLENE(PCE)	6.9	N/A
TOLUENE	0.53 J	*
TRICHLOROETHYLENE (TCE)	1.1	5
XYLENES (TOTAL)	1.1	*
METALS		
BARIUM	98.0	100
BERYLLIUM	0.41	4
CHROMIUM	6.1	100
COBALT	8.1	100
COPPER	31.6	100
LEAD	35.2	50
NICKEL	11.3	100
TIN	7.6	100
VANADIUM	5.8	100
ZINC	50.1	500
ORGANIC		
PETROLEUM HYDROCARBON	ND	5000

NOTES:

* Total BTEX (Benzene, Toluene, Ethyl Benzene and Xylene) can not exceed 100 ppb
Intermediate - sample collected between carbon units which are being operated in series.
Only detected constituents are summarized

ND - not detected

--- not sampled

J - Indicates an estimated value

N/A - not available

**Table 11800-2 - NPDES Non-PCB Sampling Results for Water Treatment System
September 2003**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-3S09	NPDES Permit Regulatory Effluent Limits
Sample type	Influent	
Date Collected	09/09/2003	
Analyte		
APP IX SEMIVOLATILES		
ACENAPHTHENE	4.3 J	100
BUTYLBENZYLPHTHALATE	0.59 J	100
FLUORANTHENE	0.61 J	100
FLUORENE	1.2 J	100
PYRENE	0.62 J	100
APP IX VOLATILES		
ACETONE	7.3 J	100
BENZENE	1.8	5*
CHLOROFORM	ND	100
ETHYL BENZENE	1.3	N/A
M,P-XYLENE (SUM OF ISOMERS)	0.82 J	*
NAPHTHALENE	4.6	100
O-XYLENE	0.40 J	*
TERT-BUTYL METHYL ETHER	17.0	70
TETRACHLOROETHYLENE(PCE)	6.2	N/A
TOLUENE	0.31 J	*
XYLENES (TOTAL)	1.3	*
ORGANIC		
TOTAL PETROLEUM HYDROCARBON (TPH)	ND	5000

NOTES:

- * Total BTEX (Benzene, Toluene, Ethyl Benzene and Xylene) can not exceed 100 ppb
- Intermediate - sample collected between carbon units which are being operated in series.
- Only detected constituents are summarized
- ND - not detected
- J - Indicates an estimated value

**Table 11800-2 - NPDES Non-PCB Sampling Results for Water Treatment System
October 2003**

**GE-Pittsfield/Housatonic River Project 1.5 Mile Removal Action
Pittsfield, MA**

(Results are presented in part per billion, ppb)

Sample ID	H2-WW000001-0-3C08	H2-WW000001-1-3C08	NPDES Permit Regulatory Effluent Limits
Sample type	Influent	Influent (duplicate)	
Date Collected	10/8/2003	10/8/2003	
Analyte			
APP IX SEMIVOLATILES			
1,4-DICHLOROBENZENE	0.66 J	0.71 J	100
BENZO(A)ANTHRACENE	ND	0.67 J	100
BENZO(A)PYRENE	ND	0.49 J	100
BENZO(K)FLUORANTHENE	ND	0.56 J	100
BUTYLBENZYLPHthalate	0.75 J	0.92 J	100
CHRYSENE	ND	0.64 J	100
FLUORANTHENE	ND	1.1 J	100
PHENANTHRENE	ND	0.85 J	100
PYRENE	0.58 J	1.6 J	100
APP IX VOLATILES			
1,2,4-TRICHLOROBENZENE	0.26 J	ND	70
1,4-DICHLOROBENZENE	0.51 J	0.43 J	100
ACETONE	ND	3.3 J	100
BENZENE	13.0	12.0	5*
CARBON TETRACHLORIDE	ND	ND	N/A
CHLOROFORM	ND	ND	100
CIS-1,2-DICHLOROETHENE	ND	ND	N/A
ETHYL BENZENE	2.2	2.0	N/A
M,P-XYLENE (SUM OF ISOMERS)	0.67 J	0.56 J	*
NAPHTHALENE	4.5	3.5	100
TERT-BUTYL METHYL ETHER	27.0	25.0	70
TETRACHLOROETHYLENE(PCE)	14.0 J	14.0	N/A
TOLUENE	0.87 J	0.81 J	*
TRICHLOROETHYLENE (TCE)	ND	0.20 J	5
XYLENES (TOTAL)	0.69 J	0.58 J	*
ORGANIC			
PETROLEUM HYDROCARBON	ND	ND	5000

NOTES:

* Total BTEX (Benzene, Toluene, Ethyl Benzene and Xylene) can not exceed 100 ppb

NDnits which are being operated in series.

Only detected constituents are summarized

ND - not detected

J - Indicates an estimated value

Table 11800-3

**Performance Specification For Treatment System
Discharge Criteria And Porewater Quality**

Compound	CAS Registry No.	Discharge Criterion (ppb)
<i>Organics</i>		
1,2,4,5-Tetrachlorobenzene	95-94-3	100
1,2,4-Trichlorobenzene	120-82-1	70
1,2-Dichlorobenzene	95-50-1	75
1,3-Dichlorobenzene	541-73-1	100
1,4-Dichlorobenzene	106-46-7	100
2-Butanone	78-93-3	100
Acetone	67-64-1	100
Benzene	71-43-2	5
Bis(2-ethylhexyl) phthalate	117-81-7	100
Chlorobenzene	108-90-7	100
Chloroform	67-66-3	100
Cis-1, 2-Dichloroethylene	156-59-2	70
Diethyl phthalate	84-66-2	100
Ethylbenzene	100-41-4	*
Polychlorinated biphenyls	1336-36-3	0.5
Polynuclear Aromatic Hydrocarbons (PAHs)	Various	100
Pentachlorobenzene	608-93-5	100
Phenol	108-95-2	100
Tert-butyl methyl ether (MTBE)	1634-04-4	70
Toluene	108-88-3	*
Trichloroethylene	79-01-6	5
Xylene(s)	1330-20-7	*
<i>Inorganics</i>		
Arsenic	7440-38-2	50
Barium	7440-39-3	100
Beryllium	7440-41-7	4
Chromium (total)	7440-47-3	100
Cobalt	7440-48-4	100
Copper	7440-50-8	100
Lead	7439-92-1	50
Nickel	7440-02-0	100

Table 11800-3

**Performance Specification For Treatment System
Discharge Criteria And Porewater Quality
(Continued)**

Compound	CAS Registry No.	Discharge Criterion (ppb)
Thallium	7440-28-0	2
Tin	7440-31-5	100
Vanadium	7440-62-2	100
Zinc	7440-66-6	500

* Total BTEX cannot exceed 100 ppb.

END OF SECTION

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 2,000-ft lengths (4,000 linear feet) of high-density polyethylene pipe (HDPE), 54-inch outside diameter (OD). Dimensional ratio (DR) 26 approximately 2.08-inch wall.

1.3 SUBMITTALS

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

SD-03 Product Data

Submit manufacturer's product data for pipe and fittings including materials of construction, dimensions, and physical characteristics.

SD-06 Test Reports

Submit information pertaining to making each fusion weld, including ambient weather conditions (temperature, wind speed, cloud cover, and precipitation); operator's name; current certificate qualifying the operator to operate the fusion equipment used; pressure applied; time of applied pressure; and temperature of joint during the fusion process.

SD-07 Certificates

Training certificates of personnel performing fusion welding shall be submitted prior to any fusion welding. Certificates shall qualify each operator to operate the fusion equipment used.

SD-08 Manufacturer's Instructions

Submit manufacturer's design, installation, handling, joining, and maintenance instructions.

1.4 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 Government or Authorized Representative. 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 Government 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 or elsewhere. Such inspection and/or tests shall be at the Government'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 Government or Authorized Representative, 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 Excavation Subcontractor at his own expense. Results of shop tests which are required in the Specifications shall be submitted to the Government prior to installation of the pipe for which such tests were ordered.

1.5 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.

1.6 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 Government 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 and PPI standards.

2.2 HIGH DENSITY POLYETHYLENE PIPE, FITTINGS AND JOINTS

- a. Pipe shall be equivalent to Driscoplex 4100 PE 3408, ASTM D 3350 cell classification 345464c with standard HDB rating of 1600 PSI at 73°F.
- b. Pipe shall be delivered to the site in 50-ft lengths and fusion welded. Flanged fittings shall be provided, as necessary, based on the approved Downriver Pipe Arrangement Plan.
- 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 American Water Works Association (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 manufacturer's 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 Government 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 trial 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 TABLE

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 <i>Detailed Work Plan for On-Plant Consolidation Areas</i> .				

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 <u>et seq.</u> 36 CFR Part 65 16 USC 470 <u>et seq.</u> 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 <u>et seq.</u> 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 22 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:

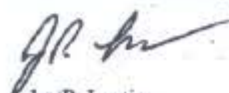
Woodlot Alternatives, Inc. has not observed any Threatened or Endangered (T&E) species in the 1 ½ Mile Reach. In this letter I briefly describe the process we used to search for T&E species in the 1 ½ Mile Reach, and refer to other documents that have been prepared supporting our observations.

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 (*Botaurus 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

ATTACHMENT 3
STATE REGISTER OF HISTORIC PLACES

STATE REGISTER OF HISTORIC PLACES 1998



MASSACHUSETTS
HISTORICAL
COMMISSION

William Francis Galvin
Secretary of the
Commonwealth



<u>Town/Name/Address</u>	<u>Designation</u>	<u>Date</u>	<u># Props</u>
Petersham (cont.)			
Petersham Common Historic District Common, North and South Main and North Sts and Arbol Rd	NRDIS	05/18/1982	45
Petersham Craft Center 8 North Main St	NRDIS PR	05/18/1982 10/02/1995	1 1
	Exp:		
Petersham Historic District Common, North and South Main and North Sts and Arbol Rd	LED 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	NEL PR	10/15/1966 05/30/1996	1 1
	Exp:		
Eaton, Crane and Pike Company Factory 75 South Church St	NRDIS	08/03/1990	9
First Baptist Church 88 South St	NRDIS PR	12/23/1991 09/22/1998	1 1
	Exp:		

Pittsfield

- 214 -

Town/Name/Address -----	Designation -----	Date -----	# Pr -----
Pittsfield (cont.)			
First Church of Christ 27 East St	NRDIS PR	07/24/1975 02/25/1998	1 1
	Exp:		
Hancock Shaker Village (Hancock/Pittsfield) Lebanon Mount Rd	MA/EL NRDIS NHL PR	04/01/1966 11/24/1968 11/24/1968 02/10/1977	3 3 3 3
	Exp:	02/10/2007	
Morewood School South Mountain Rd.	PR	05/16/1984	1
	Exp:		
	NRIND	05/31/1984	1
North Street Commercial Block 15-83 North St	NRDOE	12/06/1978	4
Old Central Fire Station 66 Allen St	NRIND NRDIS PR	01/02/1977 12/23/1991 07/02/1998	1 1 1
	Exp:		
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	01/28/1988	1
	Exp:		
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

ATTACHMENT 4
NPDES EXCLUSION LETTERS

ORIGINAL NPDES PERMIT EXCLUSION LETTER

07-0095

**United States 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:

<u>Parameter</u>	<u>CAS Registry #</u>	<u>Limit (ppb)</u>
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-Dichloroethylene	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. 1,2,4,5-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.

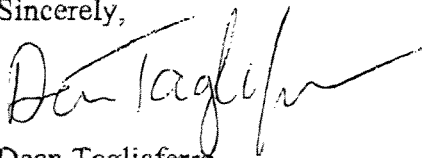
A summary of all of the analytical data (unvalidated) shall be included 1.5 Mile Reach Monthly Reports.

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

NEW NPDES PERMIT EXCLUSION LETTER

United States Environmental Protection Agency
EPA New England
One Congress Street, Suite 1100
Boston, MA 02114-2023

April 24, 2003

Mr. Joel S. Lindsay
Weston Solutions, Inc.
10 Lyman Street
Pittsfield, MA 01201

RE: NPDES Permit Exclusion
1.5 Mile Reach Removal Action
GE-Pittsfield/Housatonic River Site

Dear Mr. Lindsay:

The on-site water treatment system that is subject to the temporary NPDES Permit Exclusion issued to Weston on September 20, 2002 has been operating for seven months. During these seven months, extensive influent, intermediate, effluent sampling has been performed in accordance with the September 20, 2002 permit. During this time, the only exceedences of effluent permit limits have been for total petroleum hydrocarbons (TPH) and zinc. There was one TPH exceedence, which occurred in the first month of operation. After the first month of operation, all effluent analytical results for TPH have been non-detect. There has been two slight exceedences of zinc effluent limit. The last three monthly effluent results for zinc have been within permit limits.

Based on the analytical data collected since the water treatment system became operational and based on the fact that PCBs are the primary contaminant of concern in the 1.5 Mile Reach Removal Action, the monitoring frequencies for the parameters identified in the September 20, 2002 permit exclusion are revised as followed:

- For metals, influent and effluent sampling shall be reduced from monthly to quarterly. The next sampling event shall be required in July 2003. Sampling for thallium shall be discontinued.
- Sampling for volatile organic compounds, semi-volatile organic compounds and TPHs shall be discontinued.

EPA reserves the right to reimpose the sampling requirements for the above-referenced compounds should site-specific conditions, such as the presence of non-aqueous phase liquid (NAPL), be encountered.

If you have any questions, please contact me at (413) 236-0969.

Sincerely,


Dean Tagliaferro

cc: S. Streenstrup, MA DEP
A. Silber, GE
D. Moore, USACE
H. Inglis, EPA
Mayor Hathaway, City of Pittsfield